VETERINARY MEDICINE

FEBRUARY CONTENTS 1949

Achievements of Veterinarians 47
Foot-and-Mouth Disease in Mexico 48
Fourteenth International Veterinary Congress 48
Comments upon Animal Health Factors 49
The Sedimentation Test and Its Interpretation 50
Hyperkeratosis or X Disease in Florida 51
Significance of Specific Gravity on Whole Blood and Plasma 52
Fractures of the Mandible 53
Disease and Conditions of Racing Dogs 56
Ventricular Dropsy in the Dog 60
Observations on Feline Practice 64
Observations on Liver Flukes in Cattle 68
Serum Levels of Streptomycin in Sheep 70
Fowl Cholera 73
Veterinary Problems in Poultry Production 79
Corrective Ear Surgery 80
Allergy Observations and Treatments in Animals 82
Clinical Reports 85-86
Unusual Pulmonary Symptoms in Dogs, 85; Hypertrophy of the Prostate Gland in a Young Dog, 86.
Essentials of a Hospital for Small Animals 87
Animal Shelter Converted to Veterinary Hospital 88
Book Reviews 89-90
Guide to the Dissection of the Dog, 89; Index of Treatment in Small Animal Practice, 89; Pregnancy Diagnosis Tests, 89; Surgical Technic for Veterinary Students, 90.
Abstract 90
Cultivation of the Foot-and-Mouth Disease Virus on Bovine Fetal Tissue, 90.

VOL. XLIV
No. 2

Entered as second-class matter Nov. 8, 1920, at the post office at Chicago, Ill., under the Act of March 3, 1879.

7632 S. Crandon Ave.
Chicago 49, U.S.A.

Controlled PRODUCTION *means* UNIFORM *Results*

In Calcium Therapy

Uniform results . . . the same today, tomorrow . . . are a fundamental necessity in clinical practice. To assure this, every step in production of Jen-Sal parenteral calcium products is constantly, carefully controlled. From culturing of the gluconic acid-producing mold to final standardization, sterility testing and packaging . . . every detail is expertly supervised. This is your assurance that CBG or DCM will produce the same uniform results, day in and day out . . . a very tangible asset to busy practitioners.

Jen-Sal

C·B·G

Use C.B.G. in uncomplicated milk fever—and in hypocalcemic syndromes of other species—where immediate systemic saturation with a maximum therapeutic dose of readily ionizable calcium is indicated. C.B.G. contains 25.7% Calcium Borogluconate. Box of 12—500 cc. at $8.00.

Jen-Sal

D·C·M

Use D.C.M. in the hypocalcemic syndromes—milk fever, grass tetany, eclampsia, etc., where concurrent magnesium deficiency may be a complicating factor. D.C.M. contains 3.7 ounces of Calcium and .66 ounce Magnesium Borogluconate with 2.75 ounces of C.P. Dextrose per 500 cc. bottle. Box of 12—500 cc. at $8.40.

SOLD TO VETERINARIANS ONLY

Both D.C.M. and C.B.G. contain calcium of organic origin as borogluconate under Jen-Sal's Patent No. 2,007,786

JENSEN-SALSBERY

KANSAS CITY, MISSOURI *Laboratories, Inc.*

VETERINARY MEDICINE

Registered in U. S. Patent Office

VOL. XLIV FEBRUARY, 1949 No. 2

Published Monthly by the

VETERINARY MAGAZINE CORPORATION

7632 S. CRANDON AVE., CHICAGO 49, ILL., U.S.A.

$5.00 a year; per copy 50 cents

All matter appearing in this publication is copyrighted. No part of it may be reproduced without specific permission. Permission will be given if the purpose is unobjectionable. If there be any question as to the proprietary of reproduction the author will be consulted.

Entered as second-class matter Nov. 8, 1920, at the post office at Chicago, Ill., under the Act of March 3, 1879. Entered as second-class matter under the title of American Journal of Veterinary Medicine July 19. 1910, at Chicago, Ill., under the Act of March 3, 1879.

D. M. CAMPBELL, Editor
7632 S. Crandon Ave., Chicago 49, Ill.
Telephone SO uth Shore 8—7160

H. J. MOSTYN, Eastern Representative
P. O. Box 391, Dover, New Jersey
Telephone Dover 6-2711W.

COPYRIGHT, 1949, BY VETERINARY MAGAZINE CORPORATION

Achievements of Veterinarians*

Without veterinary control of a host of animal diseases, pestilence, insecurity, poverty, economic disaster and insufficient food supplies would be of common occurrence.

The threat to human beings of those diseases of animals communicable to man has diminished in direct ratio to the ability of veterinary medicine to suppress the respective diseases in their natural hosts.

In the long history of man's conflict with his microbial enemies there is no more brilliant chapter than that recounting the conquest of bovine tuberculosis in the United States by the veterinary profession.

The importance of this contribution [hog cholera control] to American agriculture cannot be overestimated. It probably did more to stabilize the swine industry than any single discovery before or since.

The campaign to eradicate Texas fever or, more correctly, cattle tick fever from the cattle of the United States is probably the most stupendous and protracted attack ever made on a major parasite disease. The success of the campaign to eliminate the tick, *Boophilus annulatus,* which serves as the intermediate host for the protozoon responsible for this disease, is truly one of the notable accomplishments of medical science.

*Excerpts from an address by Dr. W. H. Feldman at the 90th Anniversary celebration of the Iowa State College.

Eradication of the parasite responsible for the transmission of cattle tick fever has returned to the people of the South untold millions of dollars and made possible a prosperous cattle industry in a large area of our country in which this was not possible previously.

We have acquired sufficient knowledge to eliminate rabies from our domestic animals completely within a relatively short period, but so far we have not applied this knowledge effectively. Less sentimentality and more realism in dealing with this problem are urgently needed.

Should any one of a half dozen highly contagious diseases of cattle, swine or poultry be permitted to establish itself in this country and to spread unopposed, the consequences would be calamitous. It is the responsibility of veterinary medicine as the guardian of animal health to preclude such a catastrophe.

Foremost of the other animal diseases that threaten the economic welfare of the American farmer are brucellosis of cattle and swine and pullorum disease of chickens. For both of these conditions veterinary medicine has provided methods of control, if not of eradication. Other important animal diseases that, as a consequence of research and study by veterinarians, are no longer unopposed include bovine mastitis, equine encephalomyelitis, anthrax, glanders, blackleg, fowl leucosis, distemper of dogs, rabies and an impressive list of parasitic diseases and nutritional disturbances.

Foot-and-Mouth Disease in Mexico

The outbreak of foot-and-mouth disease in Mexico was announced in December, 1946. The futile, total slaughter plan of eradication, which got under way in April, had bogged down completely by the following July and was abandoned Nov. 26, 1947. At that time vaccination as a means of eradication was officially adopted, and approximately six months were spent in inspecting laboratories where F. & M. vaccine is produced, purchasing and testing vaccine. Vaccination in a desultory way was commenced in April, 1948. It was soon apparent that the vaccine production of the whole world was inadequate for the Mexican eradication program, and vaccine manufacture in Mexico was initiated.

Production was light for a few months but by september reached 630,000 doses and exceeded one million doses in October and showed monthly increases thereafter.

There is a lag of several weeks between production of the vaccine and vaccination of the animals. All vaccine is continuously under test for 41 days before it is used. In this period it is given five rigid tests. Vaccination in considerable amount got under way in November, 1948, and by the end of that month a total of three-quarters of a million animals had been vaccinated. Since then the number vaccinated has exceeded a million a month.

Dr. J. E. Rasmussen for the United States and Dr. Fernando Comargo for Mexico are in charge of vaccine production and testing. Of all the millions of doses produced in the laboratories under their direction, only 40,000 doses have failed to pass the rigid test to which each batch of vaccine is subjected. They have tested the product of most other laboratories producing foot-and-mouth disease vaccine. They state positively that the Mexican product is superior to any other tested.

The vaccine is expensive to produce. The United States is contributing about $1,500,000 monthly to the eradication program.

It will be recalled that as early as July, 1947, this magazine urged upon the authorities the wisdom of starting the preparation of a laboratory for the production of foot-and-mouth disease vaccine and adopting a vaccination plan as holding the only prospect of stopping the spread of the disease and eventual eradication. Had that sound policy been adopted at that time, instead of a year later when the disease had spread to a vast new area, eradication might have been accomplished, or nearing completion, at this time. The saving in dollars and in animal and human misery would have been beyond computation.

Fourteenth International Veterinary Congress

To facilitate attaining the objective of the international veterinary congresses, which is the advancement of the science and practice of veterinary medicine and surgery, the program of the Fourteenth Congress will present discussions upon subjects considered the most important scientific and practical questions of the day for the profession.

The first session of the Congress, which is under the patronage of King George, will be held in London Monday, August 8, 1949. The sessions will continue through Saturday, August 13. Registration will begin Sunday, August 7, and certain social functions will be held on that date.

Since the present world food situation is of utmost importance, each morning some person of world reputation will present a paper on the veterinary professions' contribution to some aspect of world food production. Sectional meetings will be held in the afternoons which will cover a wide range of professional subjects designed to be of interest to all veterinarians regardless of their specialties. Many social and official functions will be held during the week of the Congress.

Early application for membership in the Congress is requested. Application should be made to the secretary of the national committee for the United States, Dr. J. G. Hardenbergh, 600 S. Michigan Ave., Chicago, or to the organizing secretary of the Congress, 10, Red Lion Square, London, W. C. 1. For ordinary members the subscription price is $16.00, for student members $6.00 and for associate members (wives and families of members) $4.00. Remittance made to the organizing secretary should be £4. (four pounds Sterling) for ordinary members, £1. 10s. (one pound, 10 shillings) Sterling for student members and £1. (one pound Sterling) for associate members. Associate and student members do not receive a printed copy of the full report of the Congress.

The meetings of the Congress will be held at the Central Hall, Westminster, and in the Church House, Westminster, London, S.W.1, under the auspices of the executive committee composed of the following: president, Sir Danniel Cabot,* M.R.C.V.S.; vice-president, Professor J. B. Buxton, M.R.C.V.S.; honorary secretary, Dr. W. R. Wooldridge, M.R.C.V.S.; honorary treasurer, G. N. Gould, M.R.C.V.S.; general secretary, W. G. R. Oates, and organizing secretary, Lt. Col. J. A. Gordon Roberts, M.R.C.V.S.

*Vet Med., February 1945, pp. 58-60.

Comments Upon Animal Health Factors

By R. R. DYKSTRA, D.V.M., Manhattan, Kansas

When laboratory mice and rats are fed on a ration high in fats and low in protein they are much more susceptible to DDT poisoning. "Reducing the protein 10% doubled the DDT toxicity." Increasing the protein to 50% rendered DDT relatively nontoxic." Fats probably increase the rapidity of absorption of DDT; no theory has been advanced for the action of protein which opposes the toxic action of DDT.

The *American Journal of Medical Sciences* (No. 4, Vol. 216) has a report on "Anthrax: 36 Human Cases of the External Type Treated Successfully with Penicillin." The doses of penicillin varied from 100,000 to 200,000 units daily administered intravenously or intramuscularly. Most of the cases were among wool workers. Twenty-seven of 30 cases had negative cutaneous lesions after three days of sodium penicillin treatment. The penicillin had "no direct or immediate effect on the tissue damaging factor of cutaneous anthrax."

The chemical caponizing of fowl has frequently, during recent months, given rise to the query regarding its effect on humans consuming the meat of birds so caponized. The estrogen used in chemical caponizing is diethylstilbesterol. This synthetic agent so valuable in veterinary obstetrics, and in stimulating estrus, is in general capable also of upsetting the endocrine cart. However, evidence is accumulating that this particular estrogen is not carried over into the meat of the fowl that have been unsexed by its subcutaneous injection.

Most Hereford cattle have red pigmented eyelids; in some the pigment is present surrounding one eye—the other being clear, and in still others both eyes are clear. In the *Journal of Animal Science*, No. 4, Vol. 7, Guilbert *et al.*, present data indicating a possible relationship between the occurrence of "eye cancer" in Herefords, and the nonpigmented eyelids. It is assumed to be reasonable "that the sunburning of continuously moist, non-pigmented areas of the lower eyelids is a predisposing cause of cell derangement. . . ." and that combined with a hereditary predisposition this may result in a malignancy. It is suggested that Herefords be bred "for red around the eyes."

The *Journal of the American Medical Association* (Vol. 138, No. 13) comments on the need for reliable morbidity and mortality statistics of domesticated animals not only from the economic and public health viewpoint but as well from the rôle that infectious and contagious diseases of animals might play in biologic warfare. All veterinarians agree.

Thiouracil — structurally 2-mercapto-4-pyrimidone—, an anti-thyroid substance involves interference with the synthesis of thyroxin or it lowers basal metabolism. Research workers in animal husbandry have attempted by the use of this agent to increase weight gains in swine at a lower than average cost. At this writing results of research need clarification. For example, from one source the data obtained indicate that the addition of 0.2% of thiouracil to the ration of Poland China and Chester White crossbreeds resulted in more rapid and economical gains. On the other hand, data from another source show that 0.25% of thiouracil added to the ration of Durocs and Hampshires brought reduced growth gains; the depressed growth rate being greatest in the Hampshires. The Durocs also suffered a loss of efficiency in feed utilization. Taken as a whole, a 25% variation in dosage of thiouracil fed to different breeds of swine produced opposite effects.

Veterinarians practicing in rural communities have many times heard the statement that horse-hairs dropping into water in an animal tank or trough change to worms or snakes. It's an absurd superstition but its absurdity is as difficult to establish as are the old "hollow horn" and "wolf-in-the-tail" disease misconceptions. Clifford and Batte in the November 1948 number of the *Southwestern Veterinarian* discuss informatively the life history of nemathelminthic forms "belonging to the class Nematomorpha and to the subclass Gordiacea" that are commonly called horse-hair worms and horse-hair snakes. According to the authors, the adult worm lives in water, deposits its eggs on aquatic vegetation, hatch into larvae which enter the bodies of water insect larva, and this in turn is eaten by a grasshopper, beetle or cricket and these latter by the final host, and from these they again reach the water to develop to sexual maturity as free-living water adults.

The Sedimentation Test and Its Interpretation*

By ROBERT P. KNOWLES, D.V.M.
Miami, Florida

The sedimentation test is a laboratory test of non-specific nature; it is regarded as very important in medical practice. The technic is simple, the equipment inexpensive, and I believe the results are of value to the veterinary practitioner.

There are four methods commonly employed in running this test. They vary chiefly only in the amount of blood required and the diameter of the tube used. The results cannot be transposed directly from one to the other. One method requires only a drop of blood, while another requires 5cc.

The test is based on the principle that red cells in blood, to which an anticoagulant has been added, settle out of suspension upon standing. The speed with which the cells precipitate varies in illness and health, and even in certain physiological conditions, such as pregnancy. The reasons for the increased speed of sedimentation of blood in disease are not definitely known, but they are thought to be due to changes in the suspending fluid, in this case plasma, and also to changes in the surface of the cells themselves.

The test consists of withdrawing a measured amount of blood from a patient, mixing it with a measured amount of anticoagulant, usually sodium citrate, and allowing it to stand in a special tube. The tube is graduated in millimeters from 0 at the top to 50 at the bottom or from 0 to 200, depending on the type employed. The tube is usually placed in a rack to maintain a strictly vertical position. The red cells gradually settle to the bottom, and the final reading is made in one hour. The reading is taken at the top of the column of red cells. The results are expressed in millimeters per hour together with the name of the method employed. An alternate method is to take readings at 15-minute intervals, and plot a curve of the fall. If this is done special importance is attached to a rapid fall within the first 15 minutes.

The precipitation of erythrocytes occurs in three stages: the initial stage, in which clumping of the cells occurs; the settling stage, in which the clumps fall to the bottom of the tube, and the packing stage, in which the column of cells is compacted after they have reached the bottom.

Interpretations

As was mentioned, this is a non-specific reaction. The information derived from it is of a general character as a measure of the presence and intensity of morbid processes. One of the most important clinical purposes of the sedimentation test is the detection of more or less occult conditions. In general terms an accelerated rate always suggests organic disease rather than a functional disorder; inflammation rather than a tumor; and a malignancy rather than a benign tumor. It is of particular value as a clinical guide to the progress and activity of an infection. It is of prognostic value in that a progressive decrease to normal indicates a favorable progress, while a persistent increase indicates the reverse.

Normals (Cutler method)

Normal	0 to 8
Moderate increase	8 to 18
Moderately severe increase	18 to 30
Very severe increase	30 and up

A sedimentation rate above 44mm in the first hour almost invariably presages a fatal termination.

There is little variation in the normal sedimentation rate between males and females. The rate is high in pneumonia, in acute or chronic infections that are generalized, and increased in localized infections in ratio to the amount of tissue or area affected. It is usually high in malignancies, nephritis, nephrosis, and internal hemorrhage.

It is usually increased in anemia, but not excessively. Charts have been compiled for the so-called correction for anemia in the sedimentation rate; however, these charts make a simple procedure complex, and are not recommended. This test is of value in indicating the correct time for surgical intervention.

In his work "Laboratory Diagnosis" Osgood states, "This test is so simple and so valuable, if properly interpreted, that it should be done routinely on all patients examined. It should be regarded as a somewhat different and sometimes more sensitive criterion of bodily reaction to injury than are fever and leucocytosis. Hence, its chief value is not in differential diagnosis, but in following the progress of the individual case."

*Presented at the 19th annual meeting of the Florida State Veterinary Medical Association, October 24-26, 1948, Orlando.

Hyperkeratosis or X Disease in Florida*

By CHARLES F. SIMPSON, D.V.M.
Gainesville, Florida

In recent months the attention of veterinarians, cattlemen and the people of Florida in general has been directed toward this relatively new disease of cattle. Much curiosity and interest has been aroused by articles in local newspapers, acquainting the public with the new malady called *x* disease, which appeared in Florida cattle the past year. The term *x* in itself indicates mysterious and unknown conditions and the public is beginning to inquire about this disease, which the papers label "baffling x disease."

X disease was first recognized in New York State in 1939. Since then it has been reported from 32 other states. Georgia, Alabama, Tennessee, Mississippi and Florida being among the southern states in which the malady is known to have occurred. In August, 1948, Drs. A. L. Shealy and C. R. Forman observed peculiar wart-like growths in the mouths of four young Brahman calves near Belle Glade, Florida. They diagnosed this condition as *x* disease. Two of the calves were then sent to the USDA Regional Animal Disease Laboratory at Auburn, Alabama, where the diagnosis of *x* disease was confirmed by Doctors Gibbons and Suggs.

The history of the outbreak of this disease in Florida is interesting. Four purebred Brahman calves were purchased by a F.F.A. boy. One calf came from one ranch and the other three from another. The latter ranch sent also an old Jersey nurse cow along to help care for the calves. Approximately four weeks after the young Brahmans were purchased, proliferative growths were observed on the legs, about the ears and neck, in the mouths and on the tongues. These growths could be mistaken for warts. The skin over most of their bodies was dry and thickened. The eyes watered. There was a discharge from the nose, and salivation was profuse. The calves were emaciated and had poor appetites. In addition, the nurse cow was observed to have a large, partially healed ulcer on the ventral surface of the tongue. This may be of importance in determining the origin of the outbreak in the calves. It is interesting to note that careful examination of the two ranches from which the calves were purchased did not reveal any diseased animals.

One of the sick calves that was very near death was sacrificed and a necropsy made at the veterinary school at Auburn. It revealed the following: The skin about the nose and lips was crusted and necrotic. Elevated growths, which pealed off easily, leaving ulcers, were present on the legs. The liver was friable and swollen. The mucosa of the gall bladder exhibited several small hemorrhagic areas. The mucosa of the urinary bladder was congested. The kidneys were slightly swollen and edematous. The spleen was anemic. The digestive tract, however, revealed the most characteristic and spectacular changes. The tongue was covered with proliferated growths and had a large, necrotic erosion on the left side. Warty growths were present over most of the hard palate, about the teeth, on the mucosa of the lower jaw, and on the cheeks. The upper half of the esophagus showed several raised, proliferative areas, with superficial necrosis. Similar areas were observed in the cardiac end of the esophagus.

The cases of *x* disease seen in Florida to date present typical pictures of the condition described in the literature. Udall designates it as a "proliferative stomatitis and esophagitis," while Olafson applies the term "hyperkeratosis" to the disease. Both terms are equally applicable to the cases that have been seen in Florida. Likewise, the description given by Udall, "a fatal disease of cows and young stock characterized by emaciation, circumscribed areas of proliferative stomatitis, esophagitis and enteritis with thickening and drying of the skin and loss of hair" fits the Florida cases.

The etiological factors in hyperkeratosis are unknown. Efforts to transmit it have been unsuccessful. The USDA established a team, made up of two veterinarians, a plant pathologist and a soil chemist, to make a preliminary survey to determine the seriousness and extent of the disease. The committee visited each herd where there was a history of hyperkeratosis and attempted to gather information of value about the malady. Their "Questionnaire for Hyperkeratosis Survey" asked, among other things, the source of herd replacements, the kind and source of fertilizers used on the farm, kind and source of concentrated feed, herbicides, insecticides and fugicides used, the kind of parasites and insects prevalent on the farm, poisonous plants known to be on the farm, etc. The results of the survey should be available at an early date and should be interesting and informative.

In view of the fact that the newspapers of

*Presented at the 19th annual meeting of the Florida State Veterinary Medical Association, Oct. 24-26, 1948, Orlando. This was one of several papers termed "quickies" in which the essayists were directed to present a 45-minute paper in not longer than 10 minutes.

this state have focused attention on this disease, veterinarians should keep themselves informed on the latest developments to be able to answer inquiries authoritatively. The disease is a serious one and, in spite of the fact that only four cases are known to have occurred in Florida, the possibility exists that it may become more important. When hyperkeratosis invades a herd both the incidence and mortality are high. Doctor W. J. Gibbons, of Auburn, Alabama, is of the opinion that the disease is most often seen in the winter months. We may see a number of new cases of *x* disease in Florida next winter.

Significance of Specific Gravity on Whole Blood and Plasma

By E. A. MAJILTON, D.V.M.
Fort Lauderdale, Florida

With the belief that the copper sulfate method of calculating plasma proteins, hemoglobin, and hemratocrit, is definitely useful in everyday veterinary practice, I'd like to review it briefly.

Dr. Robert A. Phillips and Dr. Donald D. Van Slyke *et al.* of the Navy Research Unit, Rockefeller Institute for Medical Research, developed this method in 1943. By using it, a practitioner may determine useful clinical data, in the field or in the small animal hospital, easily, quickly, and accurately.

The equipment necessary is reduced to a minimum cost, and is readily adapted to a busy veterinary practice. I have used it for the past two years, and in my daily work I find it more practical than the Spencer, Dare or Sahli Methods.

Technic of the Test

The technique consists of letting drops of plasma or whole blood fall into graded series of solutions of copper sulfate of known specific gravity, and noting whether the drops rise or fall in the solutions. Each drop on entering the solution becomes encased in a sack of copper proteinate, and remains discrete without change of gravity for 15 or 20 seconds, during which its rise or fall reveals its gravity relative to that of the solution. The size of the drops does not have to be constant, hence no special pipette is needed for delivering the drops. No temperature correction is needed, because the temperature coefficients of expansion of the copper sulfate solutions approximate those of blood and plasma. The copper sulfate solution automatically cleans itself after each test, because within a minute or two after the test is completed the material of the drop settles to the bottom as a precipitate. The standard $CuSo_4$ solutions are prepared by dilution of a stock 1.1 times the density of water at 25°C.

For precise work, viz., gravities accurate within +0.0002, a "laboratory set" of copper sulfate solutions graded at intervals of 0.001 in specific gravity are used; 20 solutions cover the plasma range, 1.016—1.035 and 40 cover the range for whole blood 1.036—1.075. For rougher work, with gravities accurate to +0.001, a "field set" of 16 solutions with gravities at intervals of 0.004 suffices to cover the entire range of blood plasma. Approximate field determinations of whole blood gravities can be done with a pocket set of 6 solutions.

When it is necessary only to find whether the specific gravity of blood is above or below a given level, as in examination of blood donors, a single copper sulfate solution suffices.

Handling of Blood

The blood is obtained from the anterior cephalic vein in the dog and cat, and the jugular vein in the horse and cow. A dry needle and syringe is used and the blood is dropped directly from the syringe and needle into copper sulfate solutions to determine whole blood gravity. The remainder of the blood is then transferred to a shell vial, or test tube for the plasma to separate out.

Preparation of Standard Copper Sulfate Solutions

In principle, it merely requires the dissolving of 170 grams of finely ground copper sulfate crystals to 1002.4 gm. of water. To insure accurate solutions and attention to a few necessary details, I'd advise writing to E. H. Sargent & Co., 155 East Superior St., Chicago, Ill., and they will furnish free of charge complete information and line charts. Most up to date laboratory manuals contain detailed information on this method also.

*Presented at the 19th annual meeting of the Florida State Veterinary Medical Association, Oct. 24-26, 1948, Orlando. This is one of several papers termed "quickies" in which the essayists were directed to present a 45-minute paper in not more than 10 minutes.

Fractures of the Mandible*

By W. O. BRINKER,†D.V.M., M.S.
East Lansing, Michigan

THE incidence of fractures involving the mandible in dogs seems to be definitely on the increase, the number one causative factor being collision with automobiles. Handling of these patients is always a challenge and has been of particular interest to us. Zepp[1] reported on methods of handling these fractures. Immobilization by the use of Kirschner wire or small Steinman pin was introduced by Johnson and Farquharson.[2] By the use of a hand drill the pin was inserted entering the gum posterior to the canine tooth and proceeding at a right angle through both rami and out the other side through the gum. Schunick and Richman[3] described a method of immobilizing fractures of the body[5] and symphysis by the use of vitallium plates. The use of pin splints for fixation of fractures of the mandible was introduced by Ehmer.[4] The author[5] reported one case treated by the use of an intramedullary pin.

Clinical Features

Fractures of the mandible are usually characterized by local swelling, bruising and deformity, often with dribbling of blood-stained saliva from the open mouth and difficulty in swallowing. Movement of the jaw is restricted; there may be a deviation to one side and inaccurate occlusion with the teeth of the upper jaw. Fractures may be unilateral or bilateral. Crepitation is usually present. Radiographic examination is of particular value if the fracture involves the posterior part of the mandible.

Methods of Immobilization

Separation of the symphysis may be immobilized (1) when teeth are present by interdental wiring or (2) by the use of a Kirschner wire or small Steinman pin. Fractures of the rami may be handled by one or a combination of the following (1) interdental wiring (2) bone plates (3) Kirschner-Ehmer or Stader splint (4) intramedullary pins.

Fig. 1—Location for insertion of Kirschner wire to immobilize separations of the symphysis or fractures in that location

If interdental wiring is the method of choice, a non-corrosive steel ligature wire should be used. The procedure of wiring usually has to be modified to the individual case; the eyelet method is preferred when adaptable. Notching the base of the teeth with a file may be used to advantage in some cases, so that the wire can be anchored more securely. Patients with missing teeth, loose teeth, oblique fractures or gross displacement

Fig. 2—Separation of symphysis immobilized by insertion of Kirschner wire

Journal Article No. 1004 (N.S.)
*Presented at the 19th annual meeting of the Florida State Veterinary Medical Association, Oct. 24-26, 1948, Orlando.
†Michigan Agricultural Experiment Station, Section of Surgery and Medicine.

are usually not so adaptable to this means of immobilization.

Separations of the symphysis or fractures in that location may be immobilized by inserting a Kirschner wire (.062", .045", .035") or small Steinman pin (3/32") through both rami and at right angles to them just posterior to the canine teeth. The pin should be inserted through the skin and mandibles by a combination of pressure and back-and-forth quarter turns on the pin handle. This results in a snugger fitting pin and in turn does a more stable job of immobilization.

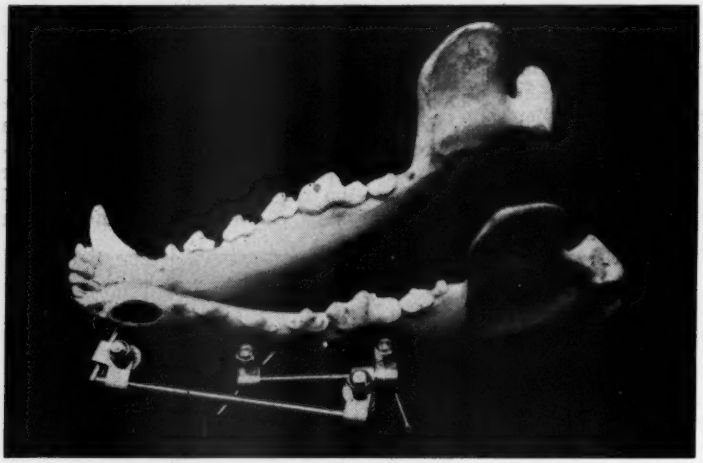


Fig. 3 — Kirschner-Ehmer splint applied with one pin anterior. Particularly adaptable for fractures that occur along the posterior border of the canine tooth

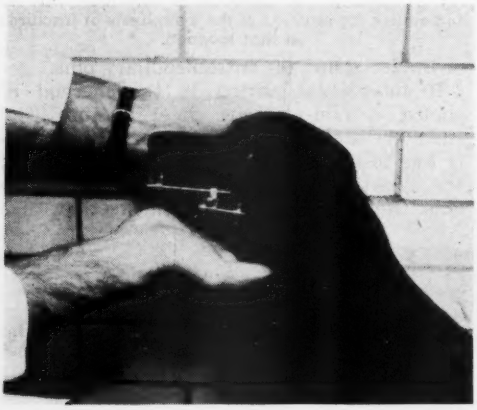


Fig. 4—Kirschner-Ehmer splint applied to the jaw of a Cocker Spaniel to accomplish immobilization where a portion of the jaw had been shot away

Open reduction with the insertion of bone plates is adaptable to both unilateral and bilateral fractures of the mandible. Open reduction is accomplished by making a longitudinal incision through the gum tissue approximately one-fourth inch below the base of the teeth. The gum tissue is reflected downward from the lateral surface of the mandible sufficiently far to allow room for the bone plates. It is quite essential that the bone plates be carefully bent to fit the curvature of the mandible. Screws should be of sufficient length to be anchored in the cortical bone on the medial side of mandible. Not less than two screws should be placed in each fragment. The gum flap is then sutured back in place. This is of particular importance so that the fracture hematoma can be maintained and thus allow normal healing. The plate is removed in approximately three weeks.

The Kirschner-Ehmer splint is adaptable to a wide variety of fractures. It is of particular value on non-unions and where a portion of the jaw bone is missing. In some cases we modify the usual procedure of placing the splint and insert only one pin in the anterior fragment instead of two. This anterior pin enters the body of the mandible along the anterior border of the canine tooth and proceeds through it and the adjoining ramus in a posterior medial direction to the posterior border of the opposite canine tooth. This modification allows for a firm fixation of the anterior fragment and the splint does not extend beyond the lower jaw, thus allowing the animal to eat as usual.

Intramedullary pinning lends itself to the repair of a wide range of fractures, both unilateral and bilateral. Small Steinman pins (3/32") or Kirschner wire (.062", .045", .035") may be inserted at the posterior angle of the mandible for fractures involving the posterior part of the ramus and from the anterior end

for fractures of the anterior part. One oblique fracture occurring at the posterior border of the last molar tooth was successfully immobilized by inserting a Kirschner wire at the angular process of the jaws and extending it forward into the anterior fragment. In all

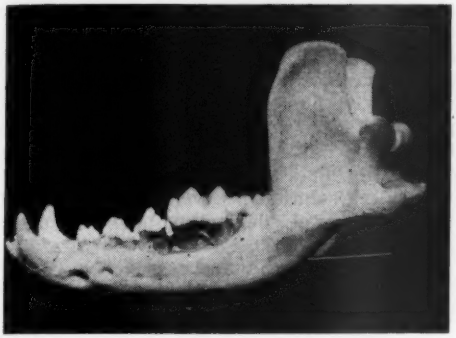


Fig. 5—Location for insertion of Kirschner wire to immobilize fractures involving the posterior portion of the ramus of the mandible

cases treated thus far, the end of the pin has been left extending through the skin and then removed in two or three weeks. This method of fixation has been used on both unilateral and bilateral fractures of the mandible with gratifying results. At the present time this is a favorite method of fixation since the pins can be inserted with a minimum of expense and time and they are well tolerated by the animal.

Discussion

With the present methods of immobilization, jaw fractures can be treated so that, following immobilization, the animal can be placed on the regular hospital ration; a liquid diet or feeding by means of a stomach tube being unnecessary. The use of pin splints and intramedullary pins in particular have made this possible. Both dogs and cats tolerate pin fixation very well. Aftercare in most cases has consisted of routine checking of the animal.

In general, jaw fractures heal quite rapidly if immobilization is uninterrupted and complete. Non-union cases respond equally well if an open reduction is performed, the bone ends freshened, soft tissues sutured, and the fragments immobilized.

Where possible it is usually advisable to suture the torn gums in compound fracture cases. This serves a two-fold purpose by protecting the fractured bones and preserving the fracture hematoma. In practically all cases, it is advisable to leave the bone fragments in place. Penicillin has aided considerably in controlling and eliminating infection.

Summary

1. Different methods of fixation of the mandible are presented.

2 Practically all types of jaw fractures can be handled advantageously by using some method or a combination of methods of pin fixation.

3. Pin fixation is well tolerated by both dogs and cats.

References

1. Zepp, C. P. The diagnosis and setting of fractured bones in small animals. *J. Am. Vet. Med. Assn.* 73:289-300 (July) 1928.

2. Johnson, H. W., and Farquharson, James. Fracture of the mandible and its treatment in the dog. *J. Am. Vet. Med. Assn.* 94:647-649, (June) 1939.

3. Schunick, Wm., and Richman, Silas. A new technique for treatment of fractures of the mandible in dogs. *Vet. Med.* 35:356-358, (April) 1940.

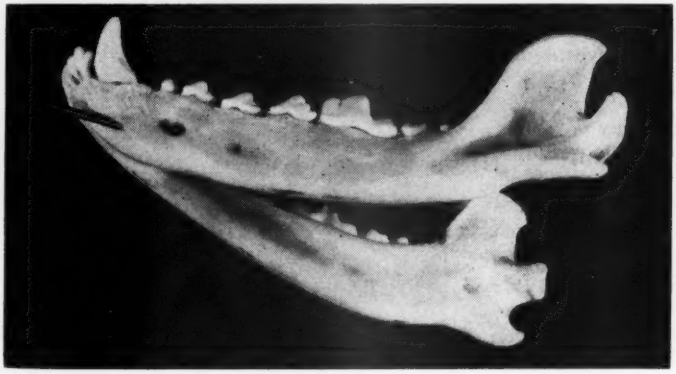


Fig. 6—Location for insertion of Kirschner wire to immobilize fractures involving the anterior portion of the ramus of the mandible

4. Ehmer, E. A. Bone pinning of fractures of small animals. *J. Am. Vet. Med. Assn.* 110:14-19, 1947.

5. Brinker, W. O. The use of intramedullary pins in small animal fractures. *N. Am. Vet.* 29:292-297, (May) 1948.

Disease and Conditions of Racing Dogs*

By J. H. YARBOROUGH, D.V.M.
Miami, Florida

RACING DOGS contribute roughly $4,500,000 annually to the Florida State Treasury from the 12 dog tracks in the state. There are 6,000 racing dogs in Florida for at least six months of the year, and 2,000 the remainder of the year. In value these dogs average about $400.00 or a total value of $2,400,000. It is conservatively estimated that the owners and trainers spend an average of $25.00 per dog yearly, or a total of $150,000, for veterinary services and drugs. About two-thirds of this sum or more goes to drug stores. I believe that a great deal of this latter amount would go to veterinarians if we availed ourselves of the opportunities that we have. We are in constant touch with the owners and trainers, as track veterinarians and veterinarians for the Racing Commission. In any case, this is a profitable field for up and coming veterinarians. It is a type of practice in which one can quickly see the results of one's treatment and surgery.

The racing dog is easily treated because, all his life, he has been handled constantly. Briefly the following are the common conditions that I have seen in handling racing dogs for the past 20 years.

Feeding

The feed of the racing dogs consists of raw meat, dry dog food, and some green vegetables. Cod liver oil, yeast and bone meal should be added. These additions particularly green vegetables, cod liver oil and bone meal, will make a surprising difference in the blood pictures. Greyhounds subsisting on this diet constantly will scale high in hemoglobin—as much as 115 to 120—and they are not dehydrated.

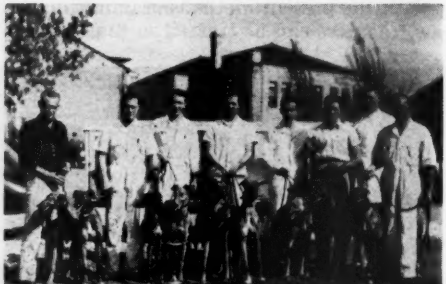
Distemper

Immunization—There are two common methods of attempted immunization against canine distemper. One is the Green method, which is being used more and more with success. By this method, the dog is immunized at the farm before it is brought to the track. The second method is by giving three injections of the vaccine two weeks apart, followed with a monthly injection. This, too, has given very satisfactory results. The dogs which despite this treatment contract distemper usually have a mild case and if treated early and properly, they recover quickly.

Treatment—The treatment for distemper consists principally in giving 1cc to 2cc of antiserum per pound of body weight, at the earliest sign of the disease and along with it 300,000 units of penicillin every other day. We usually give one grain of sulfamethazine per pound of body weight per day for no longer than three days. If the animal is not eating sufficiently, fluid such as 5% dextrose in normal saline solution is given intravenously, in varying amounts depending upon the degree of dehydration present. If the dehydration is severe, we give also percotin or adrenal cortex. Vitamin B complex is very useful to stimulate the appetite. It will be well to increase the amount of cod liver oil from a teaspoonful to a tablespoonful during the illness, and to give 6 to 12 brewers' yeast pills. Distemper, as a rule, can be diagnosed by the clinical symptoms, plus a low white blood count (this count may go down very rapidly, as low as two or three thousand), and tenderness over kidneys on palpitation. The serum is given every other day until the white blood count is back to normal.

Tonsilitis

This is usually ushered in by a marked pyrexia, sometimes 106 or 107°F, a very red throat and enlarged tonsils. If the dog has a history of having been immunized against distemper, or of having had distemper, we dispense with distemper antiserum and use 300,000 units of penicillin every other day along with sulfa drugs for no longer than three days. In most of these tonsilitis cases,



Pack of valuable greyhounds whose racing efficiency was materially lowered by chronic tonsilitis

*Presented at the 19th annual meeting of the Florida State Veterinary Medical Association, Oct. 24-26, 1948, Orlando.

the white blood count will be above normal. If the count is below normal, we give serum. It is usually advisable to remove the tonsils when the animal recovers as the tonsilitis is more than likely to recur.

Heartworms

We find heartworms in a few racing dogs each winter. Such dogs usually run out of steam. The ordinary method of examining for heartworms is not sufficient in most of these cases. In cases with a history and symptoms that lead us to suspect heartworm infestation, we use the concentration method by checking, which consists of the following:

Adult heartworm, Dirofilaria immitis in situ

Reagents: 2.5% saponin solution; potassium oxylate 2%.

Procedure.—1. Obtain 5cc of blood in the usual manner and add 1cc of a 2% solution of potassium oxylate.

2. Transfer the oxylated blood to a 10cc, graduated centrifuge tube.

3. Add 5cc of 2.5% solution of saponin; mix thoroughly to insure complete hemolysis.

4. Let stand 45 seconds and centrifuge at high speed for five minutes, or until the solution above 0.5cc-mark is transparent.

5. Decant the supernatant fluid. Invert the tube on filter paper and drain 45 seconds.

6. Examine sediment drop by drop under cover slips until all sediment has been examined. Follow the same procedure as for fecal specimens. To insure accurate results the total amount of sediment should not exceed 0.5cc.

An advantage of this procedure is it leaves the filaria alive and active, making location and identification easy.

Coccidiosis

This condition in many cases resembles distemper or its complications. A diagnosis is made by finding oocysts in the feces. For the diet in coccidiosis we use hard boiled eggs, toast and two tablespoons of steamed bone meal. Sulfamethazine, bismuth and liquor diastos is added to the feed in indicated amount.

Lungworms

This condition is not common. As a rule, I see five or six cases each winter. The symptoms resemble distemper in that there may be a discharge of pus from eyes and nose, diarrhea, cough and a high temperature. A diagnosis is made by finding, in the feces, the larvae that have been coughed up and swallowed. The treatment for this condition is mostly symptomatic.

We have had excellent results treating these dogs with the new arsenical compound that was developed by Dr. G. F. Otto at Johns Hopkins University, and discussed at this meeting two years ago.[1]

Renal Ailments

We see a few cases of nephritis every year. Since most racing dogs are young, it isn't common. We have a lot of male dogs that have difficulty urinating. But these cases are due to mal-function of the bladder or uretha. Diuretics, as a rule, improve them little if at all. Preparations, such as, metropin, atropin and trasentine are used. There is some promise that hormones may be useful in this condition.

Quite often we find females urinating blood. Those veterinarians who plan to work at the tracks should familiarize themselves with these conditions so they will know when a female is in season. It may seem strange for a veterinarian not to know when a female is coming in season. I have seen young veterinarians make this mistake. I think it worthwhile to caution them.

Leptospirosis

A few years back, we had a considerable number of cases of leptospirosis, but during the last two years, I have seen very little in racing dogs. We find these cases along with

[1]Otto, G. F., and Warren, T. H., 1947. Possible use of an arsenical compound in the treatment of heartworm in dogs. *Vet. Med.* 42:128, (April).

the soreness, vomiting, high blood urea, sometimes as high as 400 or 500. In the early stages, we use leptospirosis antiserum. Fluids, in great quantities, at least 300,000 units of penicillin daily, and if we can get them to eat, bread, cottage cheese and eggs.

Dogs seldom recover when blood urea goes above 250.

Dysentery

I believe we have all types of dysentery that are known, around dog tracks. Dysentery from worms, bad feed infectious enteritis, etc. This is treated symptomatically, depending upon severity of the case. Dogs should be given plenty of fluids intravenously and taken off feed if the diarrhea is severe. Treatment for dysentery is the same as for coccodiosis, plus plenty of fluids and B complex vitamins.

Staling Off

A number of dogs will gradually show a poor racing form. This condtion is commonly called staling off. To determine the cause requires a thorough, painstaking examination. In our experience most of this trouble is nutritional in origin. Most of these dogs show a low blood calcium. By changing the diet, feeding beef instead of horsemeat or *vice versa,* including canned milk in the ration, and by supplementing the diet with calcium in usable form, these staling off dogs will soon return to their best racing form.

Injuries

1. Fractures of the zygomatic arch. Most of these will heal with hot applications and rest.

2. Injuries to the shoulder joint, usually from running into the fence.

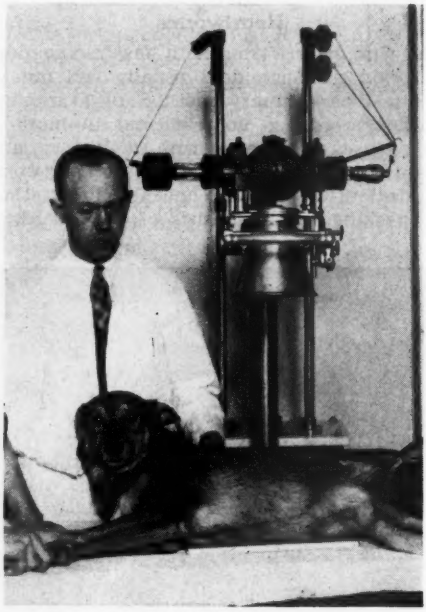
3. Dislocation of the elbow and separation of the radius and ulna. This is a very serious condition. Few of these cases recover sufficiently to race again. Fractured radius and ulna treatment depends upon the type. It may be cast or bone plate, or pins used.

4. One or all of the metacarpal bones may be fractured. They heal readily with splinting.

5. Injuries to the accessory carpal bone, or as it is commonly called the "stopper bone." This is the most common injury of the wrist. Treatment consists of injecting this area with sodium morrhuate 5% with benzol alcohol 2%.

6. Fractures of phalanges can be reduced and fixed. Dislocations seldom heal but can be remedied by removing the toe at the first, second or third joint. If the amputation is at the second or third joints, the pad can be left on the foot. This does not seem to interfere a great deal with running.

7. Treatment of injuries to the stifle joints depends on the severity of the case. Any lameness around the stifle, calls for an x-ray examination. The fibula is often fractured and will



Any lameness around the stifle calls for an x-ray examination

make a dog very lame over a considerable period.

8. The principal injury to the hock is fracture of the tubercalcis. This fracture is a difficult one to heal. Probably the best treatment is to place a splint on the back of the leg from foot up to the end of the tubercalcis.

9. A common injury of racing dogs is tearing of the ligaments of the tarsal bones. The healing in these cases is slow. It may take one to two months for these ligaments to heal. The limb has to be splinted or pinned. As a rule, the injured areas have to be injected with some irritant to increase the fibrous tissue in this area and splinted or pinned.

10. Racing dogs sometimes pull muscles loose from one or the other of their insertions. At the track this injury is called "dropped muscles." Dropped muscles may occur at any point.

11. Muscle hernias occur in various parts of both front and hind limbs. Treatment consists in suturing the fascia and rest, or injection of the area with an irritant.

12. Fractured tails may be set, or amputated.

Surgery

Tonsilectomy: General anesthesia is always advisable for this operation. Nembutal is used. It takes considerably more nembutal for racing dogs than for other breeds as a more profound anesthesia is necessary for complete relaxation. The racing dog sleeps longer from nembutal than the average dog. We give 500cc of 5% saline and dextrose solution to all of our surgical patients immediately after the operation. I believe this eliminates some of the nervous disturbances and the dog awakens quicker. The operation in the greyhound is no different from tonsilectomy in other breeds.

Spaying: This operation is performed under nembutal anesthesia. The animal should be thoroughly relaxed, abdomen shaved and prepared, using either towels or a shroud. The ovarian ligament, as a rule, is very short in a greyhound, and the barrel is very deep. With the table tilted up, and an assistant lifting up on the front shoulders, it will be easier to bring the ovaries through the incision. Then, by using a hemostat, saw through the ovarian ligament. It is well to put a line of sutures in the fascia and one in the skin.

Castration: This operation is perfomed quite often on racing dogs. A few cryptorchids and monorchids are encountered. These operations are no different in racing breeds from what they are in other breeds.

Removing Toes: These can be amputated either at the first, second or third articulations. If at second or third joint, the pad can be left on foot. This operation is done under local anesthesia. As much tissue as possible should be left—just dissect out the bone.

Extracting Teeth: This should be done under general anesthesia.

Wiring: This means putting a stainless steel wire of the calibre of a large paper clip through the sheath to prevent masturbation. Local anesthesia is employed. A hypodermic needle of a size large enough to take this wire, is pushed through both sides of prepuce, the wire inserted, the needle removed, and a ring, one inch in diameter made of the wire. This makes it impossible to protrude the penis from the sheath.

Firing the Ankle: This refers to strains of the carpus. Instead of firing, we inject a solution of sodium morrhuate in and around the broken or stretched ligaments, approximately 0.5cc at each point. In the case of injury to the ligaments attached to the accessory carpal bone, the injections are made completely around the bone and right down to the articular surface.

Jacks: This refers to puffy enlargements under the skin of the medial side about the middle of the tibia due to a ruptured blood vessel. The best treatment is to incise and treat as open wound. When this is done, the enlargements seldom return.

Tying-up: This is a condition characterized by cramping of a group or groups of muscles. Vitamin B complex sometimes relieves this condition.

It will be seen from the foregoing, there is nothing new in greyhound practice. It differs in some respects from ordinary canine practice but introduces little or nothing that the experienced practitioner has not seen at least occasionally. There is more difference between handling the owners of racing dog and owners of household pets than there is in treating the two classes of animals.

Ventricular Dropsy in the Dog*

By B. F. HOERLEIN, D.V.M.**,†
Auburn Alabama

VENTRICULAR DROPSY, or internal hydrocephalus, is a disease of the brain characterized by an accumulation of cerebrospinal fluid in the ventricles of the brain. In contrast, if the fluid accumulation is present in the subdural space, it is called external hydrocephalus. The case reports and discussion in this article will be limited to the ventricular dropsy or the internal form of hydrocephalus.

Etiology

Opinions of the etiology of this condition vary. Cecil[1] states that a knowledge of the physiology concerned in the formation of cerebrospinal fluid is necessary to comprehension of its cause and pathology. He states that most of the fluid is formed in the ependymal cells of the choroid plexuses within the ventricles and finally flows through the aqueduct of Sylvius to the fourth ventrical; from there it escapes into the subtentorial subarachnoid space. Part of the fluid flows into the spinal canal and part flows upward through channels about the midbrain and reaches the subarchnoid space over the cortex of the cerebrum. It is here that absorption takes place largely by direct passage through arachnoid villi into venous sinuses. Wechsler[2] emphasizes that the cerebrospinal fluid represents a fairly independent circulation within a closed and independent system of channels, and that the flow is essentially in one direction. Therefore any condition causing disturbance of this mechanism can produce an accumulation of fluid.

According to Wechsler,[2] internal hydrocephalus can be classified clinically into (1) congenital, and (2) acquired forms. He questions whether all forms of hydrocephalus are not ultimately secondary to some pathologic process. The congenital form may be caused from inflammatory processes, such as thickened meninges or exudates in the choroid plexus. The communications with the subarachnoid spaces or ventricles may be closed with an accompanying excessive secretion of fluid. Schlotthauer[3] states that Church and Peterson found familial or hereditary predisposition to this disease.

The acquired form of ventricular dropsy, as a rule, follows a definite cause.[3] Commonly any lesion of the cerebral aqueduct will cause hydrocephalus. Tumors, especially of the ventricles or quadrigeminal plate, are not rarely seen. Ependymal gliosis or any inflammation of the ependyma may be a factor. Any cerebrospinal meningitis can cause the condition. Hutyra, Marek and Manninger[4] state that this condition in general occurs most frequently following acute meningo-encephalitis, acute encephalitis, frequent protracted hyperemia, and tumors. Osler[5] mentions that occlusion of the foramina by parasites as well as tumors and injuries may cause the condition.

Symptoms

The symptoms of ventricular dropsy may be confusing and indefinite. They will vary as to the degree and age of the pathological process involved. In the congenital forms, enlargement of the skull is practically pathognomonic because of the soft bony structure and open sutures. In the mature animal, enlargement is usually not seen because of the hardened bone and sutures in the skull. Mild to severe impairment of mental processes are induced. Schlotthauer[3] states that the adult man may experience symptoms of headache, nausea, vomition, vertigo, Cheyne-stockes respiration, various mental states, choked optic disks, and amaurosis. Convulsions and rigidity might be observed. The pupils are dilated and stationary. Wechsler[2] describes a "cracked-pot" percussion note in acquired hydrocephalus. It is very possible that animals experience these same symptoms. In the dog, the symptoms which have been commonly observed are: depression, weakness and incoordination, inability to move and eat normally, diminished skin and extremity reflexes, amaurosis, corneal opacities and papilledema. Occasionally excitement, nervousness, convulsions, and epileptiform attacks are noticed. In our clinic, it has been observed that if extreme depression is evident, a characteristic manner of holding the head downward in an effect to alleviate fluid pressure in the brain is an outstanding symptom.

Diagnosis

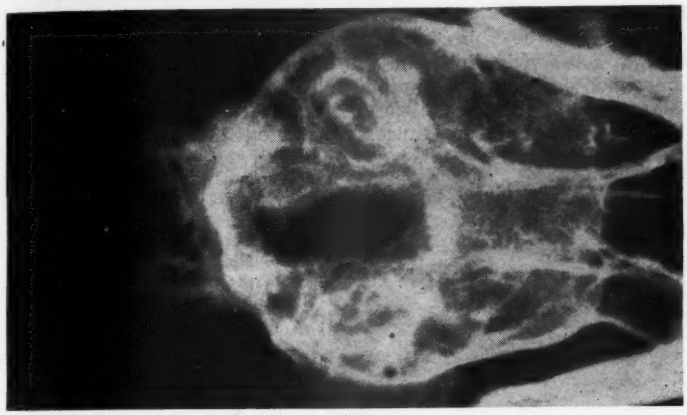
From the symptoms evidenced, the condition can be diagnosed tentatively. Positive diagnosis can be made by demonstration of excess or pathological cerebrospinal fluid by spinal or ventricular puncture or by roentgenography. Dandy[6] states that ventriculography can be best accomplished by injection of

*Presented at the 19th annual meeting of the Florida State Veterinary Medical Association, Oct. 24-26, 1948, Orlando.

**Associate Professor, Small Animal Surgery and Medicine, Alabama Polytechnic Institute.

†The author is indebted to the other members of clinical staff of A.P.I., Dr. J. E. Greene and Dr. N. D. Crandall, for their professional assistance in the preparation of this article.

air into the ventricles. However, this procedure is questioned as to usefulness and reasonability by many authorities. Wechsler[2] refers to lipidol and pantopaque or other radiopaque



Case No. 2435—Edema of the 4th ventricle and cisterna magna

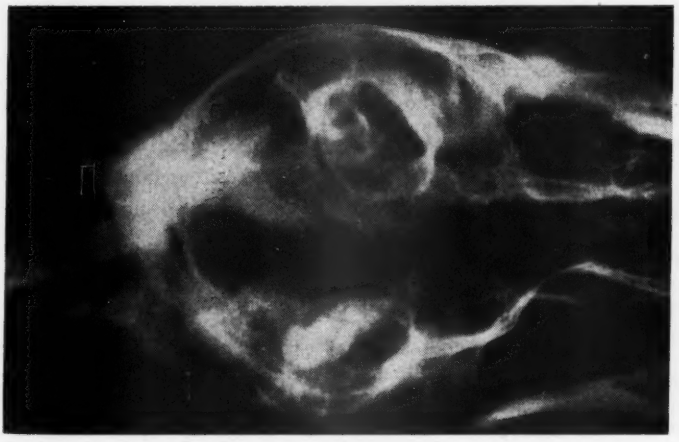
substances which can be injected in the cisterna magna to determine the area of obstruction. Cecil[1] believes that the injection of dyes into the ventricles with later attempts to recover them from the spinal fluid may furnish a means of studying the condition as to whether an occlusion exists.

Observation of the character of fluid removed is important, especially in case of a meningitis. According to Wechsler[2] bloodiness of the fluid is due either to trauma during spinal puncture or from hemorrhage into the subarchnoid space from the meninges of the brain, spinal cord, or cerebral ventricles. Fresh traumatic blood is generally not mixed with the fluid while meningeal blood is generally well mixed with the fluid. Old hemorrhages may show only a yellow color, that is, a xanthochromia.

Cloudiness of the fluid usually signifies that a large number of leucocytes are present. A cell count may be made on fluid in the same manner as a leucocyte count of blood. Stained smears of fluid will identify the type of cells present (mononuclear or polymorphonuclear leucocytes) as well as bacteria. Although other chemical tests are of value, it is thought that the above are of the most value to the practitioner.

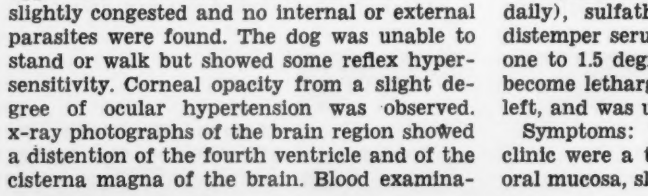
The following case histories recently observed in this clinic, are given as a prelude to a discussion of therapy.

Case No. 2435:—This female cocker spaniel was six years of age. She had been in a veterinary hospital previously for a period of 30 days with a suspected fractured cervical vertebra. There was no history of a previous injury or serious illness.



Case No. 816 — Apparently some edema in all ventricles—the distention in the lateral ventricles being most prominent

Symptoms: The temperature was 102.5°F. and a grade I tonsillitis (slightly enlarged and hyperemic) was noted. The oral mucosa was slightly congested and no internal or external parasites were found. The dog was unable to stand or walk but showed some reflex hypersensitivity. Corneal opacity from a slight degree of ocular hypertension was observed. x-ray photographs of the brain region showed a distention of the fourth ventricle and of the cisterna magna of the brain. Blood examinations were normal. Areas of mycotic dermatitis were present on the skin.



Case No. 649—x-ray taken five days after therapy was initiated. Distention of the 4th ventricle was mitigated

Treatment: Cerebrospinal fluid was withdrawn from the cisterna magna on three occasions. The first puncture on the second day of hospitalization 4.5cc of a blood-tinged fluid was removed. Immediate relief was noted. Punctures were made on the 8th and 23rd days, when 3.5 and 6cc respectively of bloody fluid were removed. Since bacteriological examinations of the fluid were negative, no parenteral antibiotic agents were used.

Supportive treatment was employed. Sodium nicotinate (140mg) injectable B-complex vitamins, and 10 to 15cc of 50% dextrose solution were administered intramuscularly daily for the first week. Myeladol and brewers' yeast were added to the diet daily. Areas of mycotic dermatitis were treated with fungicidal preparations.

The dog showed general improvement from the second week on. After a month of treatment and observation, she was practically normal. Roentgenography of the skull revealed a normal appearing brain. At the date of writing, six months later, the dog is still entirely normal.

Case No. 816—A female English Setter puppy, five months of age, was admitted from another clinic. This puppy had been given antidistemper, homologous serum periodically and had received one 5cc injection of antidistemper, splenic tissue vaccine. For an eight-day period previous to admittance, she had been treated with penicillin (150,000 units to 400,000 units daily), sulfathiazole, and homologous antidistemper serum for a persistent cough and a one to 1.5 degree fever. The animal began to become lethargic and carried the head to the left, and was unsteady in walking.

Symptoms: The symptoms noted in our clinic were a temperature of 102.0°F., anemic oral mucosa, slight tontillitis, and extreme depression. The head was held flexed toward the left abdomen most of the time. Blood urea was normal at 40mg per 100cc. Roentgenography showed bilateral distention of the lateral ventricles and a distention of the fourth ventricle.

Treatment: Puncture of the cisterna magna released 5cc of bloody cerebrospinal fluid. Bacteriological culturing of the fluid was negative. Daily intramuscular injections of a 50% dextrose solution in 10 to 20cc quantities were administered for one week. Blood transfusions, amino acid and saline-dextrose infusions were given the first few days. On the fourth day, the dog was placed on streptomycin (0.5gm daily in six divided doses four hours apart) for a period of four days because of a persistent fever of one degree.

After nine days, she showed marked improvement. x-ray examination showed that the ventricular distention had nearly disappeared. However, at the 11th day a slight chorea was observed. The condition progressed despite multivitamin injections and antispasmotic treatment. Euthanasia was advised on the 18th day.

Autopsy: No outstanding lesions were seen in the abdominal and thoracic organs. Congestion of cerebral meninges and of the ependyma of the lateral and fourth ventricles was observed. Intracytoplasmic inclusion bodies in the bladder mucosa were diagnostic of dis-

temper. It was not determined that the ventricular dropsy was associated with the nervous form of distemper.

Case No. 649.—This female Dalmatian was five years of age. The owner noticed her to be weak and staggering in the morning. Apparently she had been normal the previous evening.

Symptoms: The dog showed a temperature of 102.2°F. and slight constipation. She seemed in good spirits and had a good appetite. Incoördination was marked. Roentgenography revealed distention of the fourth ventricle in the brain.

Treatment: When the cisterna magna was tapped, 13cc of a blood-tinged cerebrospinal fluid was removed. A coccoid bacterium, atypically gram positive, was seen on a stained smear of the fluid. The dog was then simultaneously given streptomycin (0.5gm daily, in six doses given at four-hour intervals) and procaine penicillin (one 200,000 unit injection daily) for a period of four days. Intramuscular injections of 15cc of a 50% dextrose solution were given daily for six days. She was treated for ancylostomiasis on the eighth day and sent home apparently normal on the 15th day. At the date of writing, three months later, she is still normal.

Treatment

Little is recommended for the treatment of ventricular dropsy in medical literature. Hutyra, Marek and Manninger[4] suggest that chronic hydrocephalus is an incurable disease. However, in this discussion we will mention the therapy and methods we have used and those which might be tried in the treatment of this condition.

In order to alleviate the pathological effects on the nervous tissue because of fluid pressure, drainage of the excess cerebrospinal fluid is necessary. If this excess fluid and subsequent pressure is removed, the normal physiological actions are more apt to return. Occasionally in case of an obstruction, the relief is so temporary that its value is limited.

According to definition, the cisterna magna is the posterior cistern or the enlarged subarachnoid space situated between the under surface of the cerebellum and the posterior surface of the medulla oblongata. By passing a 22-gauge spinal needle anteroventrally about 2 to 3½ inches in the atlanto-occipital space, the cisterna magna may be reached, especially if it is distended. Strict asepsis must be observed in order to lessen the chances of introducing infection. It should be remembered that puncture is of value only when the accumulation of fluid extends into this cistern, otherwise harm might be done in diminishing pressure posterior to the lesion.

Since this condition may be associated with an encephalitis and meningitis, antibiotic treatment should be used. In case No. 649, a low grade meningitis was suspected and a combination of intramuscular penicillin and streptomycin therapy was used. If streptomycin is given specifically for the meningitis, authorities recommend that it be used intrathecally concomitantly with the intramuscular injection for the best effect.

Hypertonic dextrose (50% solution) was injected as a possible means of absorption of excess fluids in the body tissues as well as in the cerebrospinal system. This was also the purpose of the saline laxatives. The use of these procedures are questionable but seem to be of value.

Perhaps general nursing and good nutrition, multivitamin therapy, and a great deal of patience is a most necessary part of the therapy. When the dog is unable to eat, intravenous saline, dextrose, amino acids, and whole blood should be supplied. Refined protein solutions or preparations can be force-fed *via* stomach tube. The patient should be kept quiet and confined to a small area.

More radical surgery for relief of this condition may be indicated in some cases. If the cause is determined to be a cerebral tumor, adhesions, or a foreign body, brain surgery may be indicated.

Summary

1. The etiology, clinical manifestations, methods of diagnosis, and treatment of ventricular dropsy, or internal hydrocephalus, are presented.

2. Three case histories of the acquired type of this condition which have recently entered this clinic are discussed.

3. It is believed that this condition is not too uncommon in the dog and that it can be diagnosed and treated with some success by veterinary practitioners.

Bibliography

1. Cecil, Russell L. 1947. A Textbook of Medicine, 7th Ed., p. 1592.

2. Wechsler, I. S. 1947. A Textbook of Clinical Neurology, 6th Ed., pp. 85, 515-522.

3. Schlotthauer, C. F. 1936. Internal hydrocephalus, *J. Am. Vet. Med. Assn.*, Vol. 42:141-149.

4. Hutyra, F., and Marek, J., and Manninger. Special Pathology and Therapeutics of the Diseases of Domestic Animals. 4th Ed., 1938, Vol. 3, pp. 338-347.

5. Osler, Wm., and Christian, Henry. 1944. The Principles and Practice of Medicine, 15th Ed., 1944, p. 1294.

6. Dandy, W. E. 1919. Experimental hydrocephalus, *Ann. Surgery*, 70:129.

Observations on Feline Practice*

By E. A. DAVIS, D.V.M.
Columbus, Georgia

THIS valuable part of small animal practice has been sadly neglected. It is time for us to wake up and prepare ourselves in a more able manner to cope with the situation. Perhaps among the many reasons we neglect feline practice is the fact some of us grew up to hate cats. I find that many students are getting into a rut and developing a great distaste for cats. A large percentage of our own profession still have a vague idea that cats are primarily the pets of children and old maids. This is a wrong attitude. I have many men among my good clients who are fond of cats. In fact, the highest fee that I ever received for the treatment of any small animal was received for treating a cat. We should wake up to the fact that the number of cats going through our clinics is increasing rapidly. The cat population in this country is larger than the dog population. I believe it is estimated that we have 25 million cats in the United States. If veterinary practitioners number 10,000, that is 2500 each.

To be able to adjust ourselves to cat practice, I believe it is necessary to familiarize ourselves with the habits and customs of this valuable animal. Aside from being a pet, it has a great economic value to farmers, store keepers and warehousemen. It is estimated that each rat or mouse in our country costs us $2.00 per year. At the present time the American Humane Society is trying to collect 15,000 cats to ship from New York to some of the small countries of Europe, where their cats were eaten for food during the late war. Many no doubt recall that England ordered all cats destroyed during the war but immediately realized its grave mistake when the rats began to overrun the British Isles.

We have too few books or periodicals that give us a complete treatise on the diseases of the cat. The best way to study the habits of the cat is to have one in your home. I have learned much from my two cats in a few years that I could never have learned by reading. Feline practice not only involves the treatment of sick animals, control of infectious diseases, but also requires the ability to give the owner intelligent and sound advice on all phases of cat husbandry.

A few of the every day questions that our clients ask us are:

1. The estrus of the cat. Estrus in cats is characterized by a marked playfulness, caressive movements of the head, rolling on the floor. At the height of heat there is a congestion of the external genitals and an attraction for the male. The female usually assumes a streno-recumbent position, with an elevated pelvis. There is a treading movement of the hind feet and a constant movement of the tail. The female emits a low sound not heard at any other time. She rolls playfully about the feet of the male and accepts him at this time.

A majority of the females have at least two heat periods and sometimes three yearly. Spring and fall, and sometimes during midsummer. The frequency of estrus is influenced somewhat by environmental conditions, nutritional being the most important. Excessive heat periods are due to possible glandular malfunction. Cats that are isolated have recurrent estrus at 14-day intervals. The duration of estrus is usually two to three days. If the cat conceives, the period ends promptly, but if she is not mated, she may stay in heat seven or eight days.

Ovulation of the cat is induced by vaginal stimulation and is dependent on coitus. Copulation is followed in 24 to 27 hours by ovulation, four ova being the average. Pregnancy is of an average duration of about 60 days.

2. When to spay or castrate? I prefer to castrate cats at about three to four months of age. I prefer not to spay them until they are about six months of age.

3. The foods that are best suited and are

palatable to cats are milk, beef, kidneys, liver, fish and some cereals. There are a few prepared foods that are all right.

Cats are nervous animals and distrust strangers. They also resent rough treatment. Unlike the dog, the cat does not hold a grudge; even after we place it on the table and castrate it, it will be friendly within a few minutes.

Cats are usually brought to the office by the owner, in a box, basket, pillow case, or some other sack. I prefer for the owner to place the cat on the table and for the table to have a slick surface. Cats differ very much from dogs

*Presented at the 19th annual meeting of the Florida State Veterinary Medical Association, Oct. 24-26, 1948, Orlando.

in disposition and reaction to treatment. Physical examination, palpation and dosing with pills, tablets or oils, or hypodermic injections can be accomplished in 85 to 90% of all cats, without mechanical restraint. The other 10 to 15% are outlaws and have to be forcibly restrained until anesthetics are given. This, perhaps, is to be expected. A small percentage of dogs, too, are hard to handle. We have

It is desirable that the owner place the cat on the table for examination

replaced practically all of our mechanical appliances for restraint of cats with gentleness, persuasion and anesthesia. Cats should not be examined in the presence of dogs or unusual or excessive noises. Take the cat out of its conveyance, allow it to get quiet, stroke it gently about the back. The response to petting, in most instances, is to purr if the animal is not too ill.

If it is necessary for an assistant to hold the cat, it should be grasped by the hind legs above the hocks and the front legs above the knees. Never try to hold a cat by its feet, because it resents this. Another way is to hold the head with your left hand if one is going to dose the cat. In dosing a cat we prefer to use pills or small tablets where possible. They should be small and smooth; never try to push a pill down its throat with the finger. Drop them gently over the back of the tongue and close its mouth quickly. If this fails to make the animal swallow, use a small blunt object like an empty thermometer case and push the tablet down gently. Large tablets should be broken up into quarters or at least halves. Always allow the cat to be in a free, upright position, with all four feet on the table, when giving medicine or making an examination.

Liquids are best given with a dose syringe and a six or eight-inch quittor nozzle. Let an assistant hold cat in the manner described. The doctor should then grasp head with thumb of the right hand over its left eye, the little finger over right eye with other fingers back of ears and on neck. Pass the tube gently and quickly with the left hand.

In making hypodermic injections, the loose skin of the flank is the site of choice. The skin in this region is loose and pliable, while around the neck it is the opposite, thick and tough.

Common Ailments of Cats

Ulcers of the mouth and pyorrhea of the gums and tooth extractions are the most common of the diseases of the head. Occasionally we encounter a condition that I shall call labial ulcer, for the lack of a better name. It seems to be benign. I have seen only one description of it in the literature. A few years ago, Dr. J. N. Frost of Cornell, published this. It occurs near the nasal passages, at the junction of the mucous membranes of the mouth and the epidermis on the lip. It is pink in color, elongated and circumscribed. According to Doctor Frost, x-ray therapy is of little value in this condition. In my practice daily application of a solution of 10 grains of silver nitrate in an ounce of spirits of nitrous ether has given good results, but the treatment is a long drawn out affair. Dental fistulas are more common in cats than in dogs. They respond to proper curettement and good drainage.

Ear mites are by far the most common ailment of the ears of cats. They are easily recognized by the gray deposit in the ear and a constant shaking of the head. In some cases they will even cause fever and depression. The treatment is simple—remove debris by applying tincture of green soap or any good liquid soap and dry thoroughly. Then apply 1% rotenone in oil or rotenone dust. Be sure to apply all around the ear as the Otodectes eggs will get out of ear and hatch in the surrounding fur. Usually one to three treatments are all that are required.

The cat is provided by nature with an unusually thick skin on the head and neck. Any who have tried to stick a sharp hypodermic needle through the skin at this site already know it. Wounds in this region resulting from fighting are only minor and cause the owner more worry than the cat. Sometimes the owner brings in her cat with scratches, the result of a tomcat encounter and tells one the cat has mange.

Playful cats and kittens often times swallow a needle with thread attached. It will pass through the esophagus wall and form an abscess in the side of the neck. The symptoms are listlessness, tenderness, and high temperatures. Many times I have missed my diagnosis because I did not examine this region carefully. If these are located, opening the abscess and removing the needle usually is followed by uneventful recovery. Similar conditions will occur in other parts of the body caused by bites and wounds or bruises. The causative organism is usually the *Actinomyces necrophus*. The affected animal is not usually brought in until the abscess is sloughing. Remove all necrotic tissue and apply sodium sulfapyridine to the wound and it will heal very quickly. Sometimes injections of 1cc per pound body weight of the preparations for foot rot in cattle is of great value.

Dysuria in male cats is common, especially the old neutered cats. The chief symptoms are straining and, upon examination, a bladder tightly filled. It will not always yield to pressure; the penis protrudes outward. If the cat is in severe pain, pass a small trocar directly into the bladder through the median line anterior to the pubis and drain the urine away in this manner. Then with a small 20-gauge needle, that has been ground to a blunt point, inject 40 or 50cc of a saturated sodium bicarbonate solution through the urethea into the bladder and then massage it out; then fill again and let remain for awhile. Repeat daily for two days. If calculi are present, they should be removed surgically.

The question of hospitalization of cats is of utmost importance. We have long since discarded our cat ward. Instead we scatter our cat patients over the entire hospital with the dogs, with not more than two cats to the ward. After a full explanation the owner will see the wisdom of this procedure.

There are two types of anesthesia in general use—ether and the barbiturates. The most frequently encountered complication of barbiturate anesthesia is:

1. The great deviation from normal response to the usual dose, calculated on a body weight basis.

2. Sudden development of dangerously deep respiratory depression, sometimes accompanied by an alarming fall in blood pressure.

3. Unduly delayed recovery from anesthesia.

4. Death due to anesthesia.

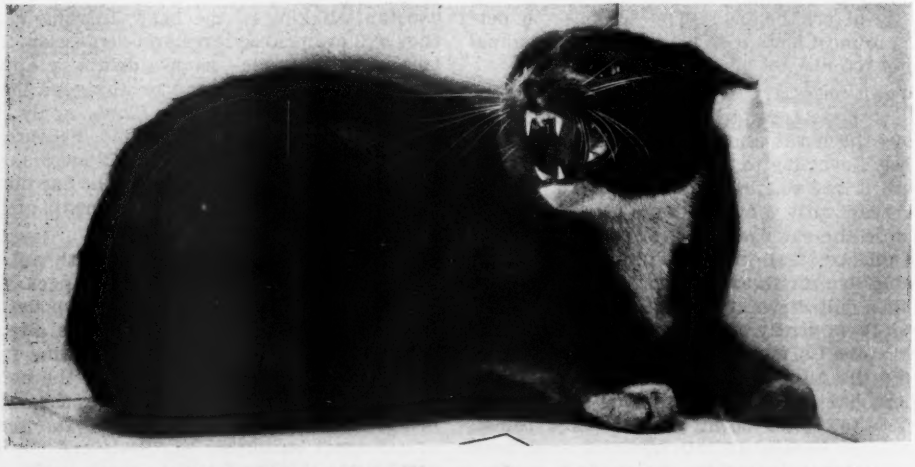
Most cats can take one grain of nembutal per five pounds of body weight safely. It may be administered intravenously, intraperitoneally or *per os*. I prefer the intravenous route.

1. Take plenty of time.

2. Give metrazol 0.25 to 0.5cc at the conclusion of the operation, then in about one-half hour, give a similar amount intramuscularly.

For most of my surgery, such as spaying and other abdominal operations, I prefer ether, because if carefully given along with plenty of air, it has been safe with me. Then too, the animal is up within a few minutes after the operation is over. In the use of either type of anesthesia keep the cat warm after the operation by the use of a heating pad, and turn the animal over at short intervals.

Surgery of the cat differs little from surgery of other small animals. The exception is the thinness of the abdominal walls. Due to these

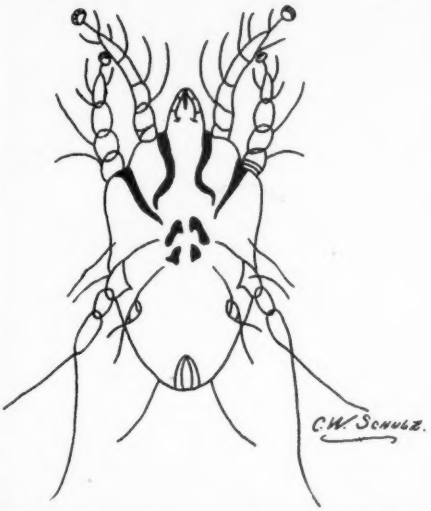


Most cats are easily handled but 10 to 15% are outlaws and require mechanical restraint

thin walls the abdominal viscera are easily palpated through them. Inexperienced veterinarians and students will mistake the pendulous kidneys for tumors and hairballs. To avoid this a fair knowledge of the anatomy of this region is essential.

Among the chief intestinal disorders are mechanical objects swallowed and accumulated hair balls. Hair balls are best removed by repeated doses of mineral oil, but if they are very large it is best to remove them surgically.

In the cat the chief external offenders are the sarcoptic mange mite and the ringworm. Sarcoptic mange is easily identified with the



Adult female Otodectes cynotis, var. felis. The ear mite infestation is the most common ear ailment of cats

microscope. It usually starts around the head and neck. First clip the body close and apply the following: one ounce of McKeon's lime sulphur dip to 10 ounces of peanut or cottonseed oil, shake well and apply; rub in well over not to exceed one-sixth of the body daily. *Over* treatment often means death.

Ringworm is fairly easily recognized by the round greyish denuded spot on the body. The treatment is clip the fur close and apply a mixture of one part sodium thiosulphate and four parts of boric acid, well mixed, to the affected areas every other day. It should be applied to the wet surface and rubbed in well. Usually a 10-day treatment is sufficient.

The worst offender among the internal parasites is the hookworm. A great many cats die from hookworm infestation because of the lack of correct diagnosis. Treatment is the same as for the dog. This parasite is the source of an extremely grevious ailment of small children who contract ancylostamiasis in the skin of the feet or buttocks while playing in sand boxes in children's playgrounds or on the beaches frequented by cats which deposit fecal matter on the sand and cover it up.

The infectious disease of cats described in literature as feline enteritis, panleucopenia, distemper etc. is characterized by a sudden onset and a short duration—one to four days. The temperature is very high, 104 to 107°F. One can describe this disease in three words—vomiting, diarrhea, death. It is necessary to differentiate it from mixed infection, streptococcic infections and pellagra. The incubation period of feline infectious enteritis is two to seven days, characterized by the above symptoms and the animal is quickly dehydrated. The definite diagnosis is arrived at only by making white blood cell counts. A normal of 13 to 15 thousand count obtains the first day, then it will be nine to 10 thousand the second day and, if the cat survives until the fourth day it may drop as low as 500. The disease is differentiated from feline pellagra by the absence of diarrhea in the latter ailment and its quick response to niacin.

I am indebted to Dr. M. K. Heath, Birmingham, Ala., for the information on feline pellagra and to Dr. Wayne Riser, Evanston, Ill., for that on feline enteritis.

Cats may be immunized to this disease if given homologous serum before onset of the disease. The treatment consists of the administration of the same serum if given early and before the temperature drops below 105°F. The supportive treatment is to give liberal amounts of Florida orange juice and karo syrup equal parts along with 500 units of ascorbic acid three or four times daily. If the cat is greatly dehydrated, give saline solution, intraperitoneally, twice daily.

According to good authorities, a large number of the alley cats are immune to this disease.

Just a little tip that has helped us in taking the temperature of a cat, always dip the thermometer in some good lubricant before trying to insert it in the cat's rectum.

Cats can be excellent patients except when affected with infectious enteritis. They respond much better than dogs to treatment of the ordinary ailments. Allow me to repeat "kindness and patience gives one a true understanding of the cat and simplifies handling". Again, I repeat, every veterinarian should own a cat. If one gives feline practice the time and thought that every one gives to canine practice as a matter of course, one will be rewarded by satisfied clients, a handsome income and the great joy of a job well done.

Observations on Liver Flukes in Cattle

By LUKE R. SINCLAIR, D.V.M.
San Francisco, California

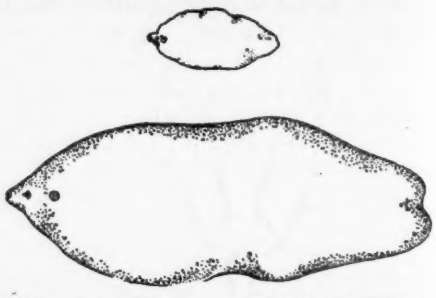
THE author, a veterinary meat inspector in the Meat Inspection Division of the Bureau of Animal Industry, has had occasion to observe the pathological changes caused by two species of liver flukes in cattle. Textbooks on veterinary parasitology, usually, offer a thorough discussion of the common liver fluke of cattle, *Fasciola hepatica,* replete with information on life history, lesions produced, etc. However, *Fascioloides magna,* the large American liver fluke, is usually mentioned only briefly, probably because of its less frequent occurrence. It is, therefore, the purpose of this article to describe and to compare the lesions produced by the two species.

The author started his meat inspection career in San Francisco and saw in the slaughtering departments a considerable number of cattle livers infested with the common fluke, *Fasciola hepatica.* While inspecting carcasses and viscera at Duluth, Minnesota, he observed a fairly large number of cattle livers infested with *Fascioloides magna,* which should not be confused with *Fasciola gigantica,* the giant liver fluke which occurs in cattle of the Hawaiian Islands and elsewhere. In addition to infesting cattle and sheep, *Fascioloides magna* has been reported also from the bison and the caribou, as well as from deer, the latter apparently being its natural host.

The eggs of *F. magna* do not escape from cattle but do escape when the parasites happen to get into sheep and goats. It has been known to produce liver damage in sheep to an extent that the host died as a result of it. The fact that the eggs do not escape from cattle and that the adults produce extensive liver damage and even death in sheep would seem to indicate that these two ruminants are not the natural hosts. Since cattle and sheep of the north woods of Wisconsin and Minnesota share with deer, pastures which are often marshy, is is easy to understand how they become infested with *F. magna.*

Before comparing the gross lesions of the two species of flukes under consideration, it might be well to consider the similarities in lesions caused by *F. magna* and lesions in a telangiectatic liver. A superficial examination of a liver afflicted with either condition, will show dark, slightly depressed areas. Usually these areas in a so called "telang" liver are uniform, 1 to 2mm in diameter, and circular in shape. However, in a liver infested with *F. magna* these areas vary in shape and size. An incision into one of them will easily determine with which condition one is dealing. A "telang" liver will simply present, macroscopically, a congested hyperemic area at the side of incision, while in a fluke infested area a cavernous space is seen, filled with a dark and slightly viscous fluid and, sometimes, containing one or two of the parasites.

It is interesting at this point to note that a liver infested with *F. hepatica* sometimes shows true "telang" areas, or lesions of so called "sawdust livers", and even abscesses. Jensen[1] *et al.* have shown rather conclusively that telangiectasis, "sawdust", and abscesses in the livers of feed-lot cattle develop in a sequence and suggest that "telang" predisposes to abscesses caused by *Actinomyces necrophorus.* Sometimes, however, these conditions are found in fluke *(F. hepatica)* infested livers of dairy cattle, which usually receive a better balanced diet than feed-lot cattle. A moot question then presents itself. Is this chain of events in fluke infested livers something entirely apart from what appears to be an identical progression in the livers of feed-lot cattle, or are the two conditions, fluke infestation and the aforementioned chain of events, simply coincidental?



Top Illustration: The common liver fluke (Fasciola hepatica) natural size. Bottom Illustration: The large American fluke (Fascioloides magna) natural size.—Special Report on Diseases of Cattle, USDA

The lancet fluke, *Dicrocelium dendriticum,* the natural host of which is the sheep, has also been reported from cattle by Price.[2] It seems to be of small importance in cattle; producing but slight tissue reaction. Occasionally, however, when there is a heavy infestation, a slight hypertrophy of the bile ducts occurs, and there may be a mild cirrhosis of the liver parenchyma.

The gross lesions of *Fasciola hepatica* and those of *Fascioloides magna* are compared in table I.

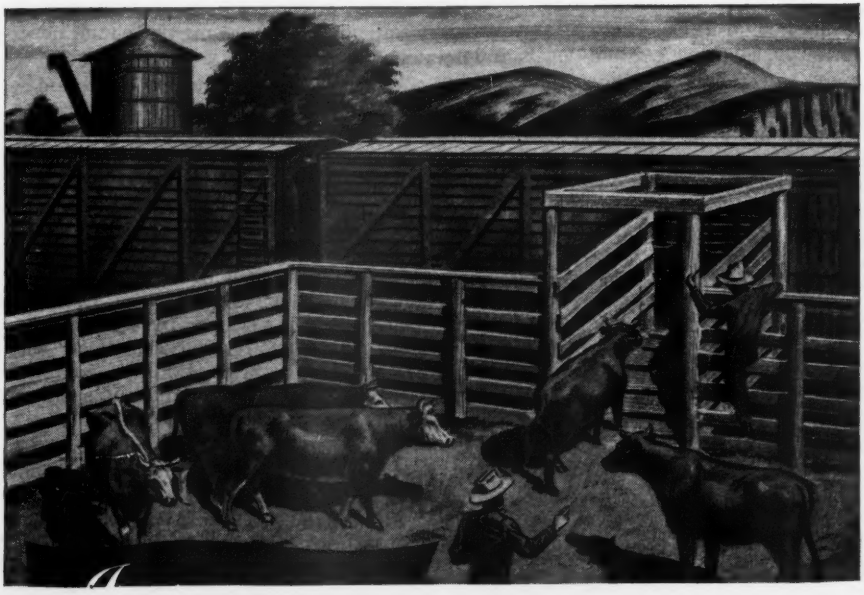
TABLE I. COMPARISON OF THE HEPATIC LESIONS PROOF USED BY *F. hepatica* AND *F. magna*.

F. hepatica	*F. magna*
In moderate to excessive infestations omasal surface of liver will show hypertrophied bile ducts standing out like thick chords.	Bile ducts not hypertrophied nor visible on surface of the liver.
Liver sometimes has "telang", "sawdust" spots on surface and in interior. Abscesses also may be present.	Surface of liver resembles superficially that of "telang" liver, i.e., dark, pitted areas are present, although varying in size and shape.
Hepatic lymph nodes normal in color.	Hepatic lymph nodes darkly pigmented with hematin.
Opposing surface diaphragm normal in appearance.	Opposing surface of diaphragm sometimes streaked with dark lines (hematin deposits).
Bile usually has consistency and color of syrup in deeper ducts with an orange pigment often present.	Bile usually normal in appearance in main bile duct at site of usual meat inspection incision.
Flukes usually easy to find in first incision along main bile duct.	Flukes not always seen at usual site of incision; often necessary to make deep incision into liver, especially through dark, pitted areas on surface where parasites usually locate.
Flukes usually confined to ducts.	Flukes sometimes found in ducts, but more often in pockets filled with dark fluid.

It is hoped that the author's observations may supplement somewhat the published descriptions of lesions caused by *Fascioloides magna*. It is also hoped that his observations may help prevent some beginner in meat inspection from condemning a liver for telangiectasis when infested with *F. magna*.

References

1 Jensen, R., Frey, P.R., Cross, F., & Connell, W.E. 1947 *J. of A.V.M.A.* 110:256-262, April.
2 Price, E. W. 1943 *Vet. Med.*, 38:294-296, August.



Serum Levels of Streptomycin in Sheep*

By E. R. DOLL,† B.S., M.A.
and M. ELIZABETH WALLACE†, B.S.

IN A PREVIOUS study, the serum level response of sheep to intramuscular injections of streptomycin hydrochloride was reported.[1] When a later investigation of horses was begun, the serum level response with the same doses per pound of body weight was found to vary from that obtained in the previous study on sheep. In view of this discrepancy in the serum level values for the two species, we considered it desirable to reinvestigate the serum level response of sheep to the intramuscular injection of streptomycin. Except for use of streptomycin calcium chloride complex** in the present study, the method of procedure was identical for both investigations. In the course of the present study on sheep and another on horses, it was determined that the serum level values given in the first report[1] were erroneous due to variation in potency of the streptomycin used for controlling assay procedure. Dependable standard material was available for the present study, and in serum level determinations involving 172 dosage trials a definite pattern of end points for hourly samples has been established for each dose. The serum level data in the previous study[1] has been corrected[2] with the present control standard to conform to the unknown sample end point pattern established in the entire investigation.

Methods

The assay procedure was the modification of the method of Price, Nielsen, and Welch[3] as previously reported.[1] Serum levels following single injections were determined in duplicate trials with doses of 0.5, 1.0, 2.0 and 4.0mg per pound of body weight. Maintenance of sustained levels of streptomycin in the blood was studied by making five serial intramuscular injections at three-hour intervals with doses of the same size. As it had been established previously that the serum levels became stabilized within well defined limits during the first six hours, blood samples were obtained for assay at hourly intervals from the seventh through the 15th hour following the first injection of streptomycin. Injections were made in the muscles of the gluteal region and thighs.

Results

With the single injections, the serum was assayed at hourly intervals for six hours. Doubling doses per pound of body weight, 0.5, 1.0, 2.0 and 4.0mg per pound, essentially doubled the serum concentration throughout the test period for each successively larger dose. The fall in serum concentration followed a similar trend for each dose. Graph I.

With serial injections of 0.5mg per pound of body weight at three-hour intervals, the serum concentration at the first hour following the third injection was double that obtained at the first hour following a single injection. Using serial injections, levels between 2.0 and 4.0 units per milliliter of serum were maintained throughout the test period from the seventh through the 15th hour. Graph II.

Serial injections of 1.0mg per pound at three-hour intervals produced serum levels varying between 4.0 and 8.0 units per ml for the seventh through the 15th-hour period. In general the serum level trend was 8.0 units per ml. Levels of 4.0 units per ml of serum occurred at the ninth and twelfth-hour periods, three hours following successive injections. Two levels of 16.0 units per ml occurred at the thirteenth hour. Levels for the 1.0mg. per pound dose were essentially double those obtained with the 0.5 mg per pound dose. Graph II.

With doses of 2.0mg per pound of body weight, the serial injections resulted in serum concentrations that were maintained between 8.0 and 16.0 units per ml. Except in one instance, levels of 16.0 units per ml of serum were obtained at the first and second hours after each successive injection for each of the five trials. Levels of 8.0 units per ml occurred in nine and levels of 16.0 units per ml in six determinations at the third hours following successive injections. In general, the serum concentrations for the 2.0mg per pound dose were double those obtained from the 1.0mg per pound dose and quadruple those of the 0.5mg per pound dose. Graph II.

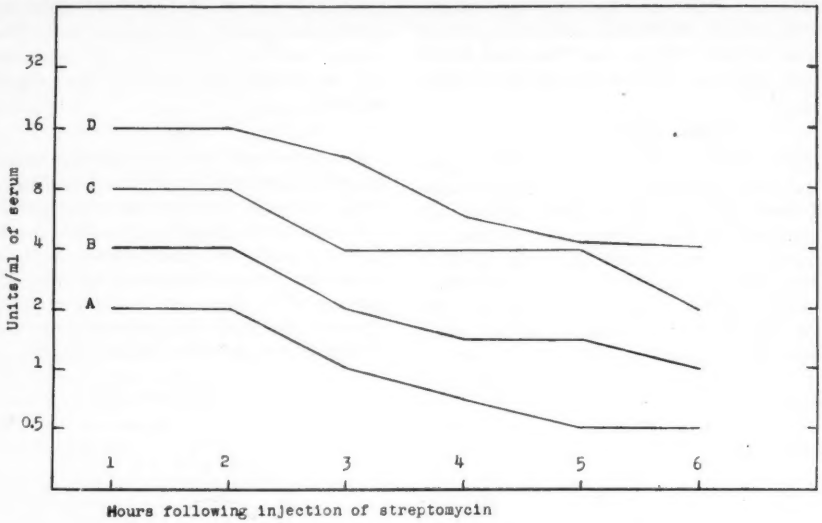
Using doses of 4.0mg per pound of body weight, serum levels were obtained that varied between 16.0 and 64.0 units per ml. In one trial, the level fell to 16.0 units per ml of serum at the third hour following each successive injection. In another trial, a level of 64.0 units

*The investigation in this paper is in connection with a project of the Kentucky Agricultural Experiment Station and is published by permission of the Director.

†Kentucky Agricultural Experiment Station.

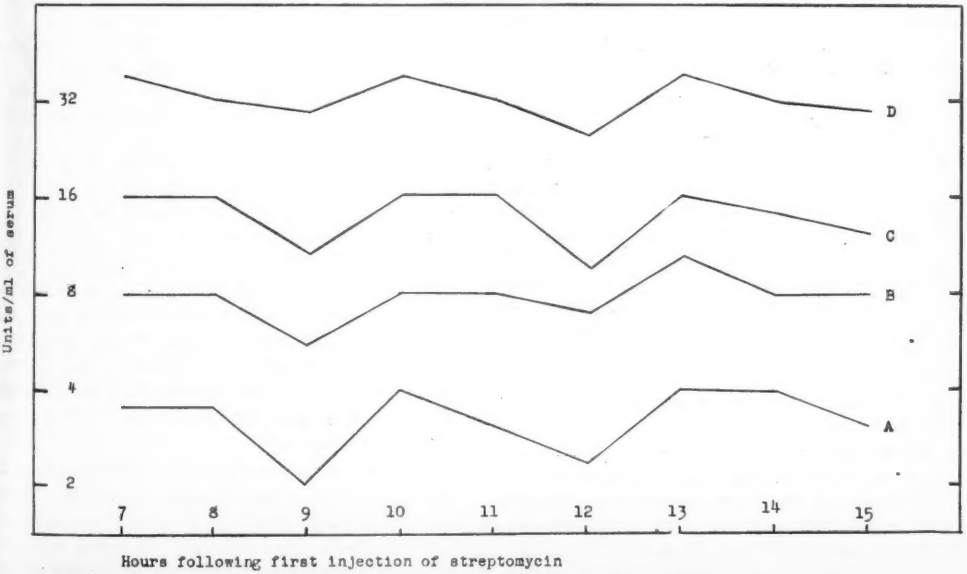
**The streptomycin used in this investigation was supplied through courtesy of Merck and Co., Inc., Rahway, New Jersey.

GRAPH I.—SERUM LEVEL AVERAGES FOLLOWING SINGLE INTRAMUSCULAR INJECTIONS OF STREPTOMYCIN



A—0.5 mg/lb of body weight.
B—1.0 mg/lb of body weight.
C—2.0 mg/lb of body weight.
D—4.0 mg/lb of body weight.

GRAPH II.—SERUM LEVEL AVERAGES RESULTING FROM INTRAMUSCULAR INJECTIONS OF STREPTOMYCIN AT THREE HOUR INTERVALS



A—0.5 mg/lb of body weight.
B—1.0 mg/lb of body weight.
C—2.0 mg/lb of body weight.
D—4.0 mg/lb of body weight.

per ml was obtained at the first hour following each successive injection. Except for a single third-hour period with 16.0 units per ml of serum, the concentrations for the other three trials were uniformly 32.0 units per ml. Graph II.

Discussion

From data obtained in a previous study[1] and in the present investigation, it appears that a blood level within well defined limits can be maintained by intramuscular injections of streptomycin at three-hour intervals. With a given dose, the serum level values have been found to fluctuate not more than a three-tube range in the two-fold serial dilution assay procedure. The serum concentrations are essentially doubled when doses of streptomycin are doubled. In general doses of 4.0mg per pound of body weight double the serum levels over those obtained with 2.0mg per pound, doses of 2.0mg double the concentrations obtained with 1.0mg, and doses of 1.0mg double the levels obtained with 0.5mg per pound of body weight. The serum concentrations during the first three hours are ordinarily one-half of the established level after several injections are made at three-hour intervals. Should one desire to establish a definite blood level range from the outset, it would be necessary to double the selected dose for the first injection.

Summary

Streptomycin injected intramuscularly in sheep at three-hour intervals maintains serum levels between 2.0 and 4.0 units per milliliter with doses of 0.5mg per pound; between 4.0 and 8.0 units per ml of serum with doses of 1.0mg per pound; between 8.0 and 16.0 units per ml with doses of 2.0mg per pound, and between 16.0 and 32.0 units per ml with doses of 4.0mg per pound of body weight.

References

1. Doll, E. R., and Wallace, M. E. 1948. Dosage and blood level of streptomycin in sheep. *J. Am. Vet. Med. Assn.* 113:55-59.
2. Doll, E. R., and Wallace, F. E. 1948. Dosage and blood level of streptomycin in sheep. Corrigendum. *J. Am. Vet. Med. Assn.* 113:168
3. Price, C. W., Nielsen, J. K., and Welch, H. 1946. The estimation of streptomycin in body fluids. *Science,* 103:56.

Interpretation of Brucellosis Test Difficult

An interesting recent discovery is that the ingestion of killed Brucella will bring about the development of agglutinins in the blood of approximately 20% of the persons who ingest them. This was reported at the 21st annual meeting of the Central Society for Clinical Research by A. I. Braude, David Gold and W. W. Spink of the University of Minnesota Medical School. The authors believe that the ingestion of killed organisms in pasteurized milk or live organisms in raw milk, which are acted upon by gastric juice, may be responsible for some of the 9.3% of positive reactions in the rural population of Minnesota. The ingestion of dead Brucella does not result in the production of agglutinins in rabbits. Presumably it is the same with swine. But, what of cattle? In herds where abortions occur many if not most of the members may ingest enormous numbers of Brucella organisms, alive or dead, with their feed and drink; *e.g.* where the forage is fed on the ground or the lot or pasture drains into the water supply.

Variations are known to occur in the reactions of cattle to the agglutination test for brucellosis. It would be interesting and probably profitable to know more definitely what they are and still more to know what causes them. It might induce some regulatory officials to hug the bole when arboreally perched.

The aberrations of the agglutination test in the presence of Brucella infection and in its absence are known but probably not adequately appraised. Certainly that was the case only a few years ago, when a cow that reacted positively to the agglutination test was regarded officially as fit only for the abattoir, regardless of her breeding, calf production or milk yield and regardless also of even overwhelming evidence that she was not infective to cattle associated with her over a long period. Primarily it was a species of egregious egoism that transferred official diagnosis in this disease from the cow barn to a distant laboratory and supplanted the veterinarian with a technician. But that is another story.

In swine a different interpretation is placed on the reaction to the agglutination test for brucellosis. The animal that reacts positively is regarded as infected although not necessarily infectious. The animal that reacts negatively is regarded with suspicion, if there is a history of exposure.

In man an opposite interpretation is put upon the test. Persons who react negatively are regarded as noninfected but those who react positively are suspected of being infected only if there is corroborative evidence of infection.

Fowl Cholera (Pasteurella multocida)*

By D. F. EVELETH†
ALICE I. GOLDSBY†
and C. I. NELSON†
Fargo, North Dakota

Fowl cholera is an infectious disease of birds often characterized by high morbidity and high mortality. The disease may be septicemic and cause a large number of sudden deaths in a flock or it may be chronic in which case the morbidity may be high but the mortality low.

This report concerns particularly a study of the Pasteurella organism and investigations into the most practical methods of decreasing losses due to fowl cholera.

Fowl cholera is caused by a microörganism, *Pasteurella multocida* (Rosenbusch and Merchant[1], though it was earlier classified as *Pasteurella avicida*. This change in classification seems justified by the fact that the organism which causes fowl cholera is undoubtedly identical, or nearly so, to that responsible for a similar disease in other domestic and wild animals,—hence the term indicating the multiplicity of its host susceptibility.

At the beginning of this study efforts were made to obtain as highly representative cultures of *Pasteurella multocida* as possible. Cultures were obtained from the Bureau of Animal Industry, the American Type Collection and certain state colleges and experiment station collections. The terminology used to describe these cultures indicates the lack of consistency with regard to the specificity of the organism for certain hosts. We isolated cultures from various animal cases of pasteurellosis, *e.g.* chickens, lambs, swine, cows and dogs.

Relative to the latter it is interesting to note that a culture isolated locally from a kennel-bred puppy was extremely pathogenic for chickens, rabbits, and mice, as well as for pups. The only clue to the possible avenue of infection for the pups in this case lay in the fact that the kennel was built in a chicken yard which had been in use for chickens not too long previously. We assume the organism may have been carried over in the soil since after a thorough cleaning the loss of puppies was completely eliminated. (Foss and Eveleth, unpublished data).

Some strains of Pasteurella which we found retained some of their pathogenicity but showed no marked specificity for their indicated host. They were pathogenic for all the usual animals though in varying degrees.

Most laboratory workers find it relatively simple to isolate Pasteurella from fluids and tissues in almost pure culture, except for an occasional staphylococcus, using a simple nutrient agar. The first transfer on plain agar grows much less vigorously and the culture fades out entirely upon succeeding transfers. Along with this disappearance of ease of culturing the pathogenicity falls very rapidly. The courtesy cultures which we obtained carried little or no pathogenicity unless entrained through a succession of organisms. Two exceptions to this rapid loss of pathogenicity must be noted. The chicken and dog strains of Pasteurella remained pathogenic longer than the other strains. The dog strain remained highly pathogenic for rabbits, chickens and mice over a long period when cultured in nutrient broth reënforced with tryptophane. When grown in tryptophane-rich nutrient broth (prepared with bacto beef or with tryptose) the production of indol was so great as to be noticeable throughout the laboratory. After three weeks of undisturbed incubation, both the chicken strain and the dog strain lost their capacity to produce indol and all of their pathogenicity. The cultures grew rather abundantly upon reisolation, however, and were morphologically identifiable as Pasteurella.

The very pathogenic dog strain was used for the preparation of bacterins, both formalized and aluminum precipitated, before loss of pathogenicity had occurred but no definite evidence of benefit was found upon challenging the vaccinated animals (mice) with fresh isolations of chicken strains. In view of the instability of the culture no judgment could be made concerning the value of the bacterins.

Maintenance of culture pathogenicity has been reported by Little and Lyons[2], Gochenour[3], Scott[4], and others, usually through the device of using animal blood serum, minced tissues, etc. In our experience any pathogenicity maintained in this way was unstable and diminished rapidly. Others have suggested that they could depend upon vitamin factors in culture for maintenance of normalcy. We found that response to the addition of vitamins (niacin, biotin—the B group) was negligible and had no effect on pathogenicity. Consequently, any suggestions for the preparation of bacterins, the dosage of which would necessarily be based on any part or number of lethal doses become fruitless.

One exception to the failure of media to sup-

*Published with the permission of the Director, North Dakota Agricultural Experiment Station, Fargo, North Dakota.
†Departments of Veterinary Science and Bacteriology, North Dakota Agricultural Experiment Station.

port both growth and pathogenicity was found. Scott[4] offers a medium which with very slight modification maintained the viability of cultures and lengthened the period of lethality. As we use it the following is substantially Scott's formula†—

Peptone (Fairchild or bacto-tryptose)	10.0gm
Agar	20.0gm
Potassium citrate	2.0gm
Potassium bicarbonate	0.5gm
Ammonium dihydrogen phosphate	0.6gm
Ferric ammonium citrate	2.5gm
Dextrose	0.5gm
Water q.s.	1000.0ml

Adjusted to pH 7.2

After prolonged culturing on Scott's medium (two months) without animal injection pathogenicity of the viable cultures practically disappeared*. We then found that all cultures, decadent or not, could be restored to their original condition by culturing for 48 hours in 10-day-old chick embryos. When transferred to slopes of Scott's agar from these embryos the organisms grew rapidly and copiously. Moreover, the pathogenicity was enhanced many fold. The time of death in mice varied from 10 hours to 24 hours. Cultures reisolated from the mice (blood, heart or liver) grew more rapidly and were even more pathogenic.

Such cultures fell into two visible categories, rough and smooth. The smooth strains were the most pathogenic and were more characteristic culturally and morphologically. The chicken strains regained their indol production ability. These organisms were markedly bipolar even in darkfield preparations. Such smooth strains stored in the refrigerator retained their pathogenicity over a long period. The rough strains were more variable in all respects and were distinctly less mucoidal. Transfer of both *s* and *r* strains to ordinary nutrient agar was again destructive of the cultures.

Microscopic examination of Pasteurella cultures which are in the process of "dying-out" on plain agar after isolation from animal cases indicates that simultaneously with the loss of pathogenicity the strain loses its capsular layer, becomes more pleomorphic, tends to autolyze, and loses its bipolarity. Smooth strains, obtained by the procedure mentioned previously, retain the capsular layer persistently, are less pleomorphic, and retain their bipolarity. This bipolarity is very noticeable in darkfield preparation of the smooth strains. Rough strains are like the usual degenerating cultures in respect to microscopic appearance.

†The addition of any source of tryptophane improves the formula.

*A preliminary report of some of these experiments was presented at the 1948 meeting of the Society of American Bacteriologists.

In the veterinary laboratory, at the North Dakota Agricultural College, serious outbreaks of fowl cholera have been encountered in routine diagnostic work. The percentage of fowl cholera cases for the period July 1944-July 1948 may be seen from the data presented in table I.

TABLE I.—PERCENTAGE OF CHOLERA OF ALL POULTRY DISEASE

Year	*Total cases*	*Cases Cholera*	*Cholera with other diseases*	*Total Cholera*	*% Cholera*
May-June					
1944	299	11	1	12	4.01
1944-45	824	5	29	34	4.12
1945-46	991	22	4	26	2.62
1946-47	619	22	15	37	5.97
1947-48	365	6	17	23	6.29

There have been reports of outbreaks of fowl cholera in which the mortality exceeded 90% of the flock. The more frequent type of the disease however, involves nearly 100% mortality of diseased birds but a morbidity of less than 20% of the flock.

The period of survival of the organisms on premises is unknown. Some poultrymen encounter a single serious outbreak of fowl cholera that subsides in time and does not recur. In other instances the disease appears year after year on the same premises. Often there are carriers of this disease among the survivors of outbreaks (Pritchett, Beaudette, and Hughes[5]). The removal of all poultry from the premises has been the procedure most frequently recommended for eliminating fowl cholera infection. Van Es and Olney[6] found that two weeks after the removal of the infected birds, poultry could be safely reintroduced into yards in which endemic cholera had existed previously. We have on record a case in which losses were so heavy the poultryman disposed of his entire flock. One year later when he took birds off range and placed them in the house he again experienced heavy losses from fowl cholera.

There appears to be no doubt that most outbreaks of pasteurellosis follow an environmental change detrimental to the host.

The most frequent diagnoses of fowl cholera occur after some radical change in management practices. A few examples may be cited to illustrate this point. In the spring there are frequent outbreaks of cholera among laying hens. The common practice in North Dakota is to keep the hens housed during cold weather but to let them out onto the ground at the first sign of thawing weather. It is usually three to five days after the hens are turned out that losses from cholera develop.

Again later in the year, there are heavy

losses especially of young turkeys. In these cases there is usually a history of a sudden change from old grain to newly threshed grain. Millet is the apparent exciting factor in most cholera outbreaks.

In our experimental work we have frequently noted that a given dose of cholera organisms would cause deaths in birds fasted 48 hours, but would not cause deaths in well fed birds.

A study of our case reports suggests that changes from moderate to hot or cold weather, the occurrence of rain or snow, changes in water supply, changes in the grain ration, excessive moisture in the houses, and concurrent infections, may all act as factors predisposing to outbreaks of fowl cholera.

The symptoms of fowl cholera are extremely variable. Death losses may appear suddenly in a flock. In fact, many poultrymen report that the first suggestion of disease in their flocks is the finding of dead birds, some on the nests and others on or under the roosts.

If the diesease assumes a chronic or semi-chronic form the following symptoms will be observed: Lameness, diarrhea, purple combs, complete cessation of egg production, enlarged joints, swollen sinuses, ruffled feathers, decreased food and water consumption, and rapid loss of weight.

The lesions are not at all specific. In peracute cases where sudden deaths occur with no noticeable symptoms, there may be an absence of visible lesions on necropsy. The acute cases often reveal ecchymotic hemorrhages on the heart, a catarrhal or hemorrhagic gastro-enteritis and a swollen liver. As the disease changes to the chronic form the lesions assume more of a localized nature such as swellings of the combs, joints and the area about the eyes.

The symptom-lesion complex of chronic fowl cholera may be easily indistinguishable from certain forms of fowl leucosis or avian pneumoencephalitis (Newcastle disease). Inability to stand or walk is frequently observed and in cases where the inner ear is infected the symptoms may be very similar to the nervous symptoms of pneumoencephalitis.

The diagnosis of fowl cholera can be made with certainty only by laboratory methods, in which tests are made to isolate and identify the Pasteurella organisms and to determine the presence or absence of any viruses.

Fowl cholera was the first disease of chickens for which an effective vaccine was developed. The reports by Pasteur leave no doubt but that his immunization experiments were successful. However, experiences in the poultry industry leave little doubt, that the bacterins now used for the prevention of fowl cholera are not completely satisfactory.

Experimental evidence as to the efficacy of Pasteurella prophylaxis by biologics is somewhat contradictory. Van Es and Martin[7] concluded that bacterins are of no value in preventing fowl cholera. Murray and McNutt[8] and Van Es and Olney[9] both found aggressins of no value in preventing the occurrence of fowl cholera.

In the eastern part of the United States the use of a bacterin has been quite effective in preventing losses of ducklings from fowl cholera (Hilbert and Witter[10]). In this study no ducks have been used so we are not in a position to discuss the value of this type of preventive medicine.

Reports from field outbreaks of fowl cholera where attempts at immunization have been made are markedly contradictory. Some poultrymen report that bacterins are useful in decreasing losses due to cholera; others find them of no value.

A bacterin prepared from a smooth strain of Pasteurella sp. was tested on several birds. The tests were conducted as outlined below. A group of nearly mature chickens were inoculated 4/28/47 with a 1 ml. suspension of cholera organisms containing approximately two billion organisms. On 5/12/47 the birds (eight vaccinated and four controls) were challenged with a field culture of Pasteurella sp. All 12 died. On 5/12/47 an additional eight birds were challenged. Six vaccinated and two controls all died of typical acute cholera. Before the birds died five vaccinated and two controls were put in the pen with the sick birds. These seven birds showed no evidence of disease. The contact birds plus two more controls were inoculated 7/1/47 with what had previously been determined to be a lethal dose of cholera organisms. None of these birds succumbed to the challenge. This is an apparent manifestation of the sudden diminution of pathogenicity that is frequently encountered with pasteurella cultures.

The results of the attempted immunization trials indicate that, in general, the use of bacterins is of little value when the immunized birds are challenged with a different strain of organisms.

To test the possibility of immunization against fowl cholera further, birds which had survived an inoculation, with or without medication were later found challenged with inoculations of Pasteurella organisms or different strains and determined to be susceptible.

The experimental work reported here, as well as many field cases, indicates that the immunity induced by use of bacterins in the control of fowl cholera is of very questionable

value in controlling this disease under field conditions.

The use of drugs in combating fowl cholera is of so little value that Murray[11], in his discussion of this disease does not offer a single type of preventive or curative drug treatment. However, others have reported finding several

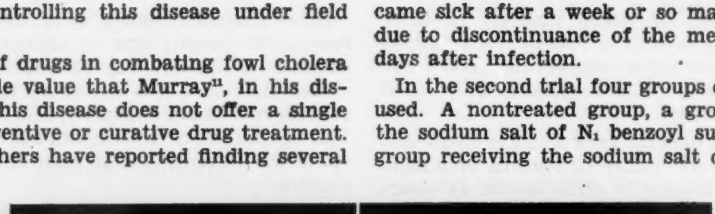


Fig. —First trial with sulfaquinoxaline. Group to the left non-medicated. Group to the right medicated. Note number of live birds in medicated group

of the sulfa drugs useful in the treatment of fowl cholera.

Sulfaquinoxaline has been reported by Delaplane and associates[12], [13] and by Peterson[14] to be effective in decreasing death losses due to pasteurellosis in poultry.

The experiments described below indicate that sulfaquinoxaline has a definite inhibitory effect on the pathogenesis of the Pasteurella organism.

In the first trial the birds were fasted 48 to 72 hours and then given an intravenous injection of Pasteurella organisms. The dose was standardized to the extent that we had previously determined 1 ml of a 24-hour broth culture contained sufficient organisms to kill a three to four pound fowl in 24 hours.

Immediately following injection of the cultures the birds were given feed. One group received only mash; the other mash to which a 0.25% concentration of sulfaquinoxaline was added. Twenty-four hours later there was one survivor in the nonmedicated group of 27 birds while there were 14 survivors in the medicated group of 28 birds (Fig. 1). In other words, there was a mortality of 50% in the treated and of 96.4% in the untreated controls. The medication was discontinued after five days and a few of the survivors later developed symptoms of chronic cholera. The fact that some birds became sick after a week or so may have been due to discontinuance of the medication five days after infection.

In the second trial four groups of birds were used. A nontreated group, a group receiving the sodium salt of N_1 benzoyl sulfonamide, a group receiving the sodium salt of sulfaquinoxaline, and a group of survivors from the previous challenge. In the second trial a culture of Pasteurella, orginally obtained from turkeys was used.

The medicated water contained 1.5 grams of sodium N_1 benzoyl sulfonamide* or 1.5 grams of sodium sulfaquinoxaline per gallon. The various groups were started on the medicated water May 25, 1948. They were inoculated June 20, 1948. There was no evidence of toxicity of these drugs at this level. These birds were fasted 48 hours previous to inoculation but, since no deaths occurred in 72 hours, they were reinoculated.

There were some death losses but most of the birds developed a chronic diarrhea, rapid emaciation and a weakness simulating paralysis of the legs and wings. The experiment was terminated July 6, 1948. The results are shown below in tabular form. The "morbidity" column is the sum of all birds dying from cholera and also those which are considered as of no eco-

	Number of birds	% Morbidity	% Mortality
Non-treated water	19	84	37
Sulfaquinoxaline	20	40	25
N_1 Benzoyl Sulfonamide	20	85	50
Cholera (survivors)	7	71	14

*The sodium salt of N_1 benzoyl sulfonamide is quite insoluble.

nomic value. They were lame, emaciated, and showed evidence of persistent diarrhea.

It may be seen that in both trials the sulfaquinoxaline group had a higher livability than did the untreated controls. In the second trial the morbidity value is of more significance than the mortality because most of the survivors in the untreated group were crippled beyond much chance of their surviving long.

Discussion and Summary

Observations recorded over a four-year study of pasteurellosis, particularly of chickens and turkeys, have furnished some information that appears to be very important in the epidemiology and treatment of this disease.

Cultures of Pasteurella organisms have been isolated from turkeys, chickens, geese, ducks, dogs, sheep and cattle, that are culturally, morphologically and tinctorially identical. Without exception these cultures die readily when an effort is made to maintain them on artificial media. Of all the media experimented with, Scott's appeared to be the best for livability, but even on this medium there was a loss of pathogenicity. Injection of non-pathogenic cultures of Pasteurella organisms into 10 to 12-day chick embryos restored their pathogenicity quickly.

Cultures of Pasteurella nearly always differentiate themselves on Scott's medium into smooth or rough strains. The smooth strains are more pathogenic for mice and live longer on artificial media than the rough strains. The smooth strains are less variable morphologically and tend to appear bipolar even when grown on artificial media.

The possibility of differences in the degree of pathogenicity of different strains of the Pasteurella organism has long been suspected. It is quite likely that such a condition exists. It is also probable that a given strain may be highly pathogenic at one time and relatively harmless at another. Just what may be responsible for this variation in the biological behavior of the organism is not known. It is interesting, however, to learn that culturing it in the embryo tissues (a nondisease resistant complex) permits the organism to regain its aggressiveness resulting in pathogenicity, or it finds some favorable factor that effects the same phenomenon.

The results of our studies, as well as those of others, indicate that prophylactic immunization is not the most effective way to control fowl cholera. It is, of course, apparent that any debilitating factor may be the exciting cause of an outbreak of fowl cholera. In some instances, we have isolated Pasteurella organisms from chicks also infected with *Salmonella pullorum*. In general, chicks are considered to be quite resistant to infection with the cholera organism.

It has been pointed out that in many cases of peritonitis associated with ruptured ova, the Pasteurella organism can be recovered from the abdominal cavity.[11] This raises a question as to whether the infection caused the original rupture of the ovum or whether the organisms grew in a suitable medium in an environment in which the body defenses were inadequate.

The observation that newly threshed grain may act as a predisposing factor in outbreaks of cholera is impossible to explain at this time. The supposition is that until the grain has dried after threshing it contains some irritant that produces an enteritis which in turn furnishes a suitable medium for the development of the cholera organism.

It does not appear that at the present time and with the present types of bacterins, prophylactic immunization is of much value as a preventive of fowl cholera.

In cases of acute outbreaks of cholera the use of hyperimmune serum has proved of definite value. Often this type of serum is used as an aid in diagnosis. Many birds showing symptoms of acute cholera make a rapid recovery, following the injection of a few milliliters of immune serum. As a prophylactic this means of cholera control is unsound. The serum is expensive and the duration of immunity is short.

In the past the use of medicines has not been significantly effective in the control of fowl cholera. Recently the use of certain sulfonamides has shown that under certain conditions these drugs definitely decrease losses due to fowl cholera.

The most effective, and at the same time most economical, method of fowl cholera control is prevention by management practices.

As has been pointed out earlier, flocks of poults and baby chicks seldom suffer severe outbreaks of cholera. It is only after the birds approach maturity that heavy losses due to cholera may be expected. There are certain precautions that can be exercised to prevent such losses. The range should be sufficiently large to supply of green feed at all times; the shelters should be large enough to accommodate the entire flock without crowding, and there should be an ample supply of clean water always available. The feed is very important; moldy and partially decomposed feed often act in a manner similar to newly threshed grain in exciting outbreaks of cholera. Precautions against the effects of changes in the weather should be made. Shade for

hot days and protection from storms and sudden cold spells in the fall should be provided.

When the birds are moved to winter quarters the houses should be cleaned and disinfected thoroughly. After the house has been cleaned it should be sprayed on the entire inside surface with a standard disinfectant.

After the birds have been placed in their winter quarters they should not be permitted outside. The house should be kept dry and when possible "dropping pits" should be used. Adequate ventilation is important but the birds should not be kept too cold. During the winter a complete ration with adequate amounts of vitamins A and D should be fed.

Bumble foot is frequently a type of chronic cholera, that follows bruising or otherwise injuring the foot. Mention has already been made of ruptured ova and peritonitis, associated with fowl cholera. When roosts and nests are too high, the birds may injure their feet in flying from the nests or roosts and the cholera organism may locate in the injured tissue. In a like manner birds flying too far at a time just before ovulation may cause a mechanical rather than physiological ovulation and the yolk instead of going into the oviduct will be freed in the abdominal cavity. The peritonitis that follows may be due to any one of a number of microörganisms but the cholera bacillus is the one most frequently found.

When warm weather comes in the spring it is of course desirable to get the birds out into the sunshine. It is not, however, good management to produce a situation that will cause an outbreak of fowl cholera. Open windows and sunporches can be used to furnish sunshine to chickens and turkeys. In this way the birds have an opportunity to become adjusted to the outdoor environment, but at the same time are prevented from drinking from pools of water in old chicken yards and from scratching in manure piles. After the weather has moderated, the ground dried and the grass started, the birds may be moved to a spring range with relatively little danger of outbreaks.

In the event that some birds develop the disease it would be a wise precaution to investigate thoroughly all of the possibilities of infection reaching the birds. If further losses occur medication may be the only alternative. The experiments of Delaplane and Higgins[13] show that when sulfaquinoxaline is fed continuously at a level of 0.033% of the mash it is of value in preventing the spread of the respiratory form of fowl cholera. Continual medication is, as a rule, economically unsound. It is better to eliminate, if possible, those factors contributing to the spread and perpetuation of disease. In outbreaks of any disease, however, every known means of combatting it should be employed.

The results of the experiments reported here as well as a survey of the literature indicate that medication with sulfaquinoxaline is therapeutically feasible.

Acknowledgements

The N_1 benzoyl sulfanilamide used in these experiments was furnished through the courtesy of Fort Dodge Laboratories, Inc., Fort Dodge, Iowa.

The sulfaquinoxaline used in these experiments was furnished through the courtesy of Dr. D. F. Green, Merck and Company, Inc., Rahway, New Jersey.

Bibliography

1. Rosenbusch, C., and Merchant, I. A. 1939. A study of the hemorrhagic septicemia pasteurella. *J. Bact.*, 37:69-89.
2. Little, Paul A., and Lyons, B. M. 1943. Demonstration of serological types within the nonhemolytic pasteurella. *Am. J. Vet. Res.*, 4:110-112.
3. Gochenour, W. S. 1924. Hemorrhagic septicemia studies: The development of a potent immunizing agent (natural aggressin) by the use of highly virulent strains of hemorrhagic septicemia organisms. *J. Am. Vet. Med. Assn.*, 65:433-441.
4. Scott, J. P. 1930. A simple mineral mixture agar for cultivation of *P. boviseptica*. *J. Bact.*, 20:9-14.
5. Pritchett, Ida W., Beaudette, F. R., and Hughes, T. P. 1930. The epidemiology of fowl cholera. IV. Field observations of the "spontaneous" disease. *J. Exp. Med.*, 51:249.
6. Van Es, L., and Olney, J. F. 1940. Inquiry into the influence of environment on the incidence of poultry diseases. Nebraska Agr. Exp. Sta., Res. Bul. No. 118.
7. Van Es, L., and Martin, H. M. 1920. Value of commercial vaccines and bacterins against fowl cholera. Nebraska Agr. Exp. Sta., Res. Bul. No. 18.
8. Murray, C., and McNutt, S. H. (cited from Biester, H. E., and Devries, Louis, 1943, Diseases of Poultry, Iowa State College Press).
9. Van Es, L., and Olney, J. F. 1936. Immunizing value of commercial hemorrhagic septicemia aggressins. Nebraska Agr. Exp. Sta., Res. Bul. No. 87.
10. Hilbert, K. F., and Witter, W. F. 1936. Report of the poultry disease laboratory at Farmingdale, Long Island. Ann. Rep. New York State Vet. College, 1934-1935, p. 38.
11. Biester, H. E., and Devries, Louis. 1943. Diseases of Poultry. Iowa State College Press, pp. 259-270.
12. Delaplane, J. P. 1945. Sulfaquinoxaline in preventing upper respiratory infection of chickens inoculated with infected field material containing *Pasteurella avicida*. *Am. J. Vet. Res.*, 6:207-208.
13. Delaplane, J. P., and Higgins, T. C. 1948. Sulfaquinoxaline in the prevention and control of chronic fowl cholera. *Cornell Vet.*, 38:267-272.
14. Peterson, E. H. 1948. Sulfonamides in the prophylaxis of experimental fowl cholera. *J. Am. Vet. Med. Assn.*, 113:263-265.

Veterinary Problems in Poultry Production

By W. R. HINSHAW, D.V.M., Ph.D., Davis, California

Studies made at the Connecticut and Kentucky experiment stations and reported in references quoted by the Committee on Transmissible Diseases of Poultry, at the 52nd annual meeting of the U.S. Livestock Sanitary Association at Denver, October 1948, indicate that, in carriers, the gall bladder is a common reservoir for *Salmonella pullorum*. Their results indicate that cultures made routinely from the gall bladder will increase greatly, the incidence of isolations of *S. pullorum* from reactors.

Evidence is accumulating that the so-called Canadian *x* type of *S. pullorum* (also known as the XII_2 variant) is wide spread in U.S. poultry flocks. At the 52nd annual meeting of the U.S. Livestock Sanitary Association at Denver, October 1948, the Committee on Transmissible Diseases of Poultry gave references to the isolation of this type from Kentucky, Connecticut, Michigan, and Minnesota. In a survey made by the USDA Bureau of Animal Industry the variant was found to exist in only two of the 10 states included in the survey. In a survey of cultures of *S. pullorum* isolated from birds and collected by the writer during the past few years (unpublished data), only one strain of the XII_2 variant was found. This strain was isolated from a duckling in 1935 by the late Dr. H. A. Hoffman and given to the writer for study.

At a recent conference on animal nutrition sponsored by the California Hay, Grain and Feed Dealers Association and the The University of California, Dr. T. H. Jukes of the Nutrition Department, Lederle Laboratories, reviewed the present status of this vitamin. He defined it as one of the vitamin B complex, associated with animal proteins. It has been demonstrated in cow manure, chicken feces, liver, fish products, and eggs from hens supplied the vitamin. Unlike the other members of vitamin B complex, yeast is a poor source. It is of interest that the amount found in chicken feces is dependent on the temperature of storage. None is produced in freezing weather, and there is evidence that the vitamin is produced as a result of microbial fermentation of the feces. Doctor Jukes and associates have recently isolated a bacterium from chicken droppings which is capable of producing the vitamin when grown in suitable media. Of interest to human medicine is the fact that this vitamin is probably the same as the antipernicious anemia factor of liver. The vitamin has been recently purified and crystallized by a laboratory in England and by research workers at the Merck Laboratories. The latter group named it vitamin B_{12}.

Carbon monoxide poisoning may cause losses in chicks and poults in poorly ventilated brooders or as a result of defective coal or oil burners. The principal lesion seen in carbon monoxide poisoning is a bright cherry-red color of the lungs and blood. Restlessness, stupor, labored breathing, and incoördination are the common symptoms.

We are hearing a lot about deep litter and built-up litter for poultry houses these days. A new purpose which has recently been suggested by research at the Ohio Agricultural Experiment Station (Farm and Research 33(250):17) is that it serves as an important source of nutritional factors necessary for the production of eggs of good hatchability. One of the reasons for this is the presence, in properly handled litter, of the vitamin which is known as "the animal protein factor" "the cow manure factor" and vitamin B_{12}. This vitamin promotes growth in chicks and is necessary for good hatchability of eggs.

Although manufacturers of live Newcastle virus vaccines have repeatedly warned against the vaccination of birds in production or about to come into production, a large number of poultrymen take chances and vaccinate their laying pullets. The results according to the reports have varied but in most instances, a deleterious effect on egg production and on egg quality has been noted. Veterinarians should be cautious in their recommendations concerning the use of this vaccine and should insist that poultrymen follow the advice given by the makers of the vaccine. Another misuse of the vaccine is the attempt made by some to "stretch" the dosages specified on the label. Dr. A. S. Rosenwald of the California Agricultural Extension Service has observed that this practice is fairly common. He has also found that poultrymen have been mixing fowl pox vaccine and Newcastle vaccine and applying both at one application. Some have even been guilty of mixing fowl pox, laryngotracheitis, and Newcastle viruses for a single application. Certainly such "stretching" should be discouraged, both from the standpoint of too much dilution, and the possible ill effects from multiple vaccinations. Again such procedures are contrary to the recommendations.

Corrective Ear Surgery*

By LOUIS L. VINE, D.V.M.
Chapel Hill, North Carolina

In recent years I have seen many Boxers, Dobermans, and Great Danes with malformed ears; ears which are in various positions unbecoming the respective breeds. Many valuable dogs have been ruined because of such imperfections (Fig. 1 and Fig. 2).

An examination of the ear usually reveals the fault to be in the cartilage. The cartilage is broken or weakened at one to several places. The ear will either pull over the head as in figure 1 or droop as in figure 2. The pull of the auricular muscles against the broken cartilage produces the abnormal appearances. There are also cases in which the cartilage is soft, the ear being in the same position as it was at birth. This may be seen either in both ears or unilaterally.

In a rickety animal one expects to find drooping ears due to a lack of calcium. However, often times in a healthy animal the ears droop for no apparent reason. In order to help harden the cartilage along with the corrective surgery I prescribe 1/10 grain parathyroid extract daily, with calcium, phosphorous and cod liver oil.

My orthotic operations on abnormal ears vary slightly with each animal, according to the individual defects. However there are basic principles in the two types of ears. I shall first discuss the overhead ear as seen in figure 1.

Upon feeling the cartilage, one will undoubtedly find a separation somewhere near the base of the ear. The break usually is horizontal. The main objective of the whole operation is to counteract this break in the cartilage with a scar that is opposite to the ruptured area. In this case orthosis necessitates a scar that is vertical and perpendicular to the break. If we can produce a thick scar in the cartilage the ear will then stand up as seen in figure 3, which is the same Boxer puppy shown in figure 1, three months after the plastic surgery was performed.

There are various methods that may be used to get this scar tissue to develop in the cartilage. For a minor case, when the ear bends over on the head only a little, I scarify the cartilage on the inner surface of the ear. The cartilage is scraped subcutaneously and the only outward sign is the nick in the dermis. The instruments used for this purpose to good avail are tarter scrapers or small tenetomes. The object is to actually tear the cartilage. A simple clean incision in the cartilage will not give good results. The cartilage heals too quickly and no scar tissue ensues. However, if the cartilage is scraped very roughly, a good scar will follow. I usually make three vertical scars parallel to each other (Fig. 5).

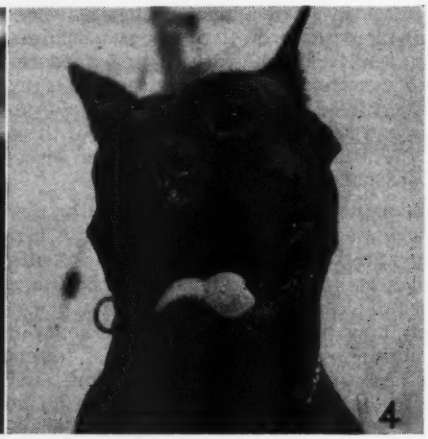
For more severe cases, when the ear bends over close to the head, I make two elliptical incisions in the same vertical plane as is shown in figure 6. The incision goes through the skin and also takes out the cartilage. These two generous incisions are sutured together with silk. This method takes longer to heal as a larger scar is desired. A thick scar promotes a straight ear.

The proper restraint after the operation is probably the most important step in the procedure. I have tried various methods often

*Demonstrated at the Central North Carolina Veterinary Clinic, June 8, 1948.

changing them with the weather—I mean that literally. In hot weather, tape sticks to the skin and causes infections. I usually try to plan the operation for spring, fall, or winter. However, this is not always possible. I also use various tin and aluminum plates that are fitted over the head of the dog. A large size tin can makes an excellent ear form. The shape of the ear is cut out of the tin or aluminum and this can be bent in either direction up or down. Of course, it is well padded with cotton and gauze. A well taped ear generally determines success or failure of this operation. The tin or aluminum is required to stay on the ear 10 to 14 days with the change of dressing every three or four days. The tape can be eliminated when the scar has begun to form and is firm enough to keep the ear up.

In ears that droop, as in figure 2, we are dealing with a cartilage that is not strong enough to resist the downward pull of the auricular muscles. The skin on the top surface and base of the ear has to be removed in a broad elliptical incision. Mattress sutures are used to insure a strong union of the tissues (Fig. 7). The ear is also scarified on the inner surface as in the previous case to give the cartilage added strength. If the ear is not immobilized properly the stitches will tear out and the ear will fall. The ear taped over the head tip to tip will offer excellent immobilization for this type of correction, as illustrated in figure 4. This is the same puppy shown in figure 2, three months after a plastic surgical operation on this Boxer.



Conclusion

With proper handling, both during the operation and post-operatively, most dogs doomed to a life of ear deformity can be restored to the original standard of their breed.

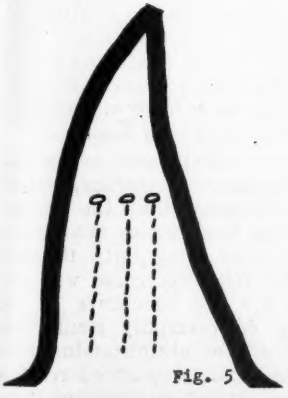


Fig. 5

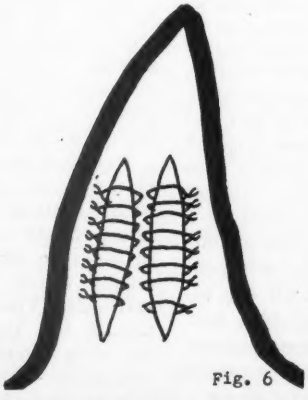


Fig. 6

Fig. 7

Fig. 5—Three deep lines of scarification. Fig. 6—Elliptical sections of skin and cartilage removed. Fig. 7—Elliptical section of skin removed from external surface of ear

Allergy Observations and Treatments in Anim

By ALVIN D. KAPLAN, B.A., D.V.M.
Arlington, Massachusetts

THE accumulating evidence of the important role that allergy or anaphylaxis or protein sensitization plays in the field of veterinary medicine has, in the last couple of years, stimulated the search for further knowledge and a better understanding of its treatment. The author has had the good fortune to see in small animals numerous cases of so-called summer itch, serum sickness, Boston Terrier asthma, dry eczema, food reactions (gastrointestinal intoxication), drug allergies, hives, localized edema, fever due to allergy and urticaria. In the majority of these cases the causative agents were either seemingly absent, or not well understood.

My attention having been drawn to the new work being accomplished in the study of histamine antagonists, the antihistaminic agents, of which two have been on the market for a number of years, dependence was not placed entirely upon the old accepted treatments of epinephrine hydrochloride injections, topical sulfur therapy in the skin irritations, wet packs in the edema cases, etc. However, at no time were such treatments altogether abandoned, as adjuncts to the newer and more progressive procedures.

Allergy is a condition of unusual or exaggerated specific susceptibility to a substance which is harmless in similar amounts to the majority of the same species. Of the two theories as to the cause of allergy, the chemical is the one most generally accepted. This theory is that histamine, or a histamine-like substance, a toxic chemical derived from injured cells due to a local stimulus or injury to the skin, has the power to start a chain of reactions leading to local reddenings, succeeding local wheals, etc. The latest antihistaminic agents are thought to act by competitive attachment to the cell receptor, displacing or replacing the histamine, which is regarded as one of the causes of allergy. With this in mind, the vast possibilities of antihistaminic treatment in veterinary medicine is not too difficult to comprehend. In various cases I was able to break down these allergies into bronchial allergy or asthma; contact allergy where the hypersensitiveness is marked by a delayed eczematous reaction to prolonged contact between the epidermis and the allergen; mental allergy, a condition in which the allergen is an emotional or mental state and, finally, the physical allergy or hyposensitivity, a condition in which the animal is sensitive to the effects of heat, cold, light, and drugs.

Like many of my colleagues, I "reached for the moon" in attempting to alleviate the common summer itch and so afford some sort of relief not only to the animal but also to the owner. It wasn't too difficult to realize what we had often passed off as skin irritations, the habitual summer itch, etc., were actually allergic manifestations of either external or internal origin that may occur, occur and occur again. Close observations of diets has convinced me that certain types of canine and feline eczema are directly due to a dietary deficiency of essential fatty acids, and that an almost obvious case of skin irritation may be only secondary to an internal cause. Through elimination and addition applied to the ration some such cases have been cleared. A simple food substance, such as scya bean, when eliminated has been definitely proved to be the sole cause of continual breaking out with hives in an Irish Setter. One must never lose track of the fact that many animals, especially dogs, differ as to their degree of allergic susceptibility, or sensitivity, just as persons differ in this respect, although perhaps not so greatly.

How allergy really can be the cause of the dermatitis or skin inflammation from which so many dogs, as well as cats, suffer, isn't too complicated. Eczema, an inflammatory skin disease, with vesiculation, infiltration, watery discharge, and development of scales and crusts, and attended with restlessness and endless local itchings, is really a form of dermatitis, dermatitis aestivalis to be specific, when it appears during the warmer weather. There is an allergic eczema which is really a dermatitis due to allergy to foreign protein; an angio-neurosis, a neurosis affecting primarily the blood vessels, and which asserts itself by the animal scratching without evidence of disease. Finally, in some cases the presence of allergies seem to be an important factor in the slowing of wound healing.

Therefore, there definitely is the new branch of medicine, antihistaminic therapy, coupled with practical treatment, that the veterinarian should accept and employ much more, in order to eventually bring forth the good results which the following cases will substantiate. They are not conclusive by any means, but they do exemplify possibilities, for, even though all the antihistamine products differ in the capacity to afford relief to itching, and hives, all will relieve some cases.

Case 1.—A six year old spayed mongrel ter-

rier was presented in June for treatment of her annual recurring attack of summer itch. For three preceding seasons the animal had suffered from this general body itch with very little relief afforded by the various veterinarians who were visited. On close observation it was easy to see that the skin of the entire body was a mass of small elevations, that were much inflamed and a possible cause of the dog's constant scratching. In various places there were many lacerations due to vigorous scratching as a result of the intense irritation. The animal was given almost instant relief by an application of local anesthetic lotion with which we have often obtained results, which the owners of the animals regarded as almost miraculous. Immediately she was placed on a regulated diet free of bones. Foreign proteins were injected with oral administration of various alternatives and in a couple of days, marked improvement was observed, in that the animal had little desire to scratch.

On the third day, the skin again began to show signs of inflammation with slight hive-like elevations. At this time, it was definitely ascertained, that an allergy was the causative factor and that, even though excellent relief would be obtained with our topical anesthetic lotions, internal treatment was necessary. Torantil tablets, a Winthrop product from desiccated kidney of hogs and containing an enzyme, histaminase, which inactivates histamine hydrochloride, were given orally, 60 units a day. This antihistaminic treatment was continued for three days at the end of which the animal was dismissed in almost perfect condition as far as the skin irritation was concerned. Our regular mild lotion was dispensed with definite instructions to return the following year before the summer season started. Accordingly, the animal was presented the following year as directed, for an examination and we were told that little trouble was had regarding the scratching, but the owner was intensely desirous of preventing the yearly recurrence of the pruritus during the warm months. Concentrates of vitamins were prescribed, as well as alteratives, with excellent results. But the animal was returned a short while later, when signs of discomfort and scratching became evident. Immediate relief was afforded by antihistamine treatment. At present the dog is well, almost completely free from its allergic condition, and constantly under its owner's care and close observation for any signs of skin irritation. It may be added that this animal is being fortified with large doses of vitamin concentrates and is at all times, under careful diet supervision which may account for some of the good results.

Case 2.—A male Irish Setter, seven months of age, with a history of a continual recurrence of wheals on the belly and thighs accompanied by scratching was presented for treatment. On examination, except for the wheals, the dog appeared normal, being in the best of spirits and having an excellent appetite. Until the owner could prepare and bring in a definite schedule of past feedings of the animal, an anesthetic lotion with torantil tablets was dispensed. The application of the external medication gave immediate relief from the constant scratching while the antihistaminic treatment of about 100 units completely removed the hive-like condition.

One week later the owner reappeared with a list of as many of the foods the dog had eaten as he could remember. He brought along the dog which had a new crop of wheals and a dermatitis. Applications of emollients were made but without internal medicaments. Elimination of as many articles of food as possible was planned.

This was a slow and serious procedure for the owner, but in about two weeks it was ascertained that soya bean meal was definitely the "culprit." This ingredient is now completely eliminated from the animal's diet with the result that the wheals, the dermatitis and the scratching are things of the past.

Case 3.—A male, mongrel terrier, seven months of age and with a history of scavenging, was brought to the office for examination. The temperature was normal, the dog quite active, but the lips, jowls and the face seemed to be swollen and out of proportion. With the history of the animal's past bad habits, and the physical symptoms to consider, a gastro-intestinal intoxication was suspected. Theophorin tablets, a synthesized antihistaminic drug, were administered orally at the rate of four 25mg tablets daily. In two days the face swelling disappeared completely.

Case 4.—A male, mongrel poodle, seven months of age, was treated for a mild gastritis and, afterward as a routine, was given the regular prophylactic dose of distemper antiserum. The following day the dog's head was swollen much out of proportion; the owner stating that the swelling started about two hours after the previous call had been made, reached its peak during the night and was receding at the time seen. A 0.3cc dose of 1:1000 solution of adrenalin intramuscularly and, orally, 20 units of torantil were given immediately. Tablets were left for further treatment. Later, I was informed that the swelling disappeared completely in about six hours. Here was an allergy possibly due to either of two single causes, a combination of

both, or food intoxication or serum reaction.

Case 5.—A spayed Boxer, eight months of age, suffering from enuresis, was brought in for treatment. An ovariohysterectomy had been performed four days previously and the owner was quite disturbed over the inability of the animal to control the discharge of her urine. A diethylstilbestrol injection was given and oral tablets of the same drug were dispensed with instructions for home treatment. The following day the original trouble had about ceased but the animal was now rather thoroughly covered with "little bumps." Discontinuance of the tablets was advised. The next day the hive-like condition had disappeared. One week later the dog was given one tablet of diethylstilbestrol because of some little urine incontinence and almost immediately the wheals appeared. However, the condition cleared almost immediately without medication.

Case 6.—A male collie, six months of age, with enormously swollen cheeks and lips was the object of a hurried night call. The only information obtainable was that the dog's condition had appeared with dramatic suddenness in a matter of minutes, about one hour previous to the call. Since the animal was in excellent condition with a normal temperature, one benadryl (P.D.&Co.) capsule was given orally, while a couple were left to be given by the owner. I was later informed that it wasn't necessary to give the other capsules, for the swelling disappeared completely.

Case 7.—A four-year-old, neutered, cat was received at the office for treatment of a chronic skin condition which no doubt looked quite hopeless to those who were unsuccessful in past treatments. The history was one of duration since its kitten days, with a diagnosis ranging from mange to incurable eczema. With a history of recurrence during the warm weather and a negative fecal examination an allergic cause was sought. Cats are less susceptible to skin ailments than dogs, but nevertheless they may be great sufferers. A mild, soothing, sulfur-anesthetic lotion was applied directly to the skin, after the fur was shaved off, and sulpho-arsenic alteratives were given orally. A careful check of the animal's diet revealed fish and liver to be the main foods. Fish was immediately eliminated and meat and codliver oil substituted. One week later the skin looked a great deal better, the fur was beginning to fill in, and the continuous scratching had almost ceased. At present the cat is fed an almost fish-free diet and the original dermatitis is almost completely gone.

Our clinical studies indicate rather conclusively that allergy is as extensive and as important in veterinary medicine as it is in the field of human medicine. The foregoing cases constitute only a few of the many allergic manifestations we have recorded in our case book. Later entries show that other antihistaminic preparations are giving even better results than those used in the foregoing cases, in that fewer and fewer untoward aftereffects are produced. Ten of the 13 antihistaminic preparations on the market at the present: benadryl (Parke, Davis & Co.); thenylene (Abbott); diatrin (Wm. R. Warner); neoantergan (Merck); histadyl (Lilly); decapryn (Wm. S. Merrell); pyribenzamine (Ciba); neohetramine (Wyeth); tagathen (Lederle); and hydrillin (Searle), possess chemical skeletons of either the ethylene diamine nucleus (=N—CH_2CH_2N=) or the amino-ethyl phenolic ether nucleus (—OCH_2—CH_2—N=). The principal difference between these various competitive products depends upon the different groupings attached to the skeletons. As a result of this change in chemical structure, an animal that doesn't tolerate or doesn't respond to one formula can often be treated successfully with another.

The remaining three products do not have chemical skeletons of either type of structure and so differ considerably from each other. Antistine (Ciba) has an imidazole ring, similar to that found in histamine, with which it is believed the drug acts as competitor; trimeton (Schering) has an amino propane structure, in other words it contains a —CH_2-CH_2—NH_2 nucleus; and thephorin (Hoffman-LaRoche) has a fused nucleus comprising pyridine and indine. Thephorin is unique in that instead of bringing on a slight sedative effect, as do other antihistaminic agents, it induces restlessness in the animal treated.

In non-specific treatment of allergy, I believe that these easily administered antihistaminics preparations are much to be preferred to the old method of adrenalin injections from which many cases of painful aftermaths have resulted and even some annoying irritations.

Conclusion

The treatments employed in the foregoing allergies and similar cases are successful in that they alleviate a condition and bring about immediate symptomatic relief to the animal. However, giving the antihistaminics must be continued while the cause persists. Only by further examination of the diet and surroundings, dismissal of causative agents, and careful study of the history and discovery and elimination of the source of the allergy, can much be done to prevent recurrence of the condition.

Clinical Reports

Unusual Pulmonary Symptoms in Dogs

CASE 1.—The first of a series of peculiar cases was in an eight-year-old female lap dog of the Chihuahua type, weighing six pounds. This bitch had been sick six days showing inappetance and lassitude.

At this time the temperature was 104.5°F. The breathing was very rapid but not in any way labored or painful as in pneumonia.

Treatment: Bacterial antiserum 6cc and sulfa compound 6cc intraperitoneally, daily for three days with the usual supplementary vitamin treatment. This dog has been convalescent for three weeks but her breathing has not returned to normal although it is much improved. She eats well and is quite frisky.

Case 2.—A case in a Cocker, seven months of age, was brought in for treatment with a history of having suffered a stomach upset lasting two days, about two weeks previously, then it just went off feed and started rapid breathing. This dog was given sulfa compound 20cc intraperitoneally and another 10cc in 24 hours. This brought the temperature down to 102°F., but had no effect on the respiration. Some food was taken. On the third day 20cc of homologous serum was injected. This dog has not been returned for further treatment but is reported to be improving.

Case 3.—A mongrel collie, three years of age. He was brought to me on the third day of his sickness. He was breathing very rapidly, had a cyanotic tongue and mucous membranes of the mouth, temperature 99°F. He (like all other cases) was quite alert and bright-eyed, but he was nevertheless evidently *in extremis* as far as his pulmonary circulation was concerned. He reminded me of cases of gassing in the 1914-18 World War. He died the following day. This dog probably had distemper as a pup for, as the owner expressed it, he had a "cold" for several days during February, 1946.

Case 4.—Irish Terrier six months of age, was admitted to the clinic October 1st for spaying. She was given simultaneous virus and serum October 10. November 3rd the dog was returned because of lack of appetite and rapid breathing. The temperature was 105°F.

Treatment: 15cc sulfa compound peritoneally and 1cc thiamine chloride subcutaneously. The following day she received 10cc of antibacterial serum which was repeated for four days with some lessening of symptoms. November 8th penicillin, 25,000 units every six hours, intraperitoneally, was started and continued for four days. The amount injected was increased to 200,000 units daily and continued for two days, at which time a twitching of the skin of the back was noticed. The injections were changed to 50,000 units of penicillin, subcutaneously, twice daily for four days. The appetite returned to normal and remained good. About this time, November 13th, mild convulsions occurred and the chorea became more severe. These symptoms gradually worsened until the patient was chloroformed November 19th. Throughout the illness the rapid breathing had kept up, sometimes being very distressing and again improving but in no way correlated with the treatment.

At no time was there any cough in any of the cases described in this report, nor was there any enteritis or ophthalmic involvement.

Case 5.—This case involved a litter of six Brittany puppies three weeks of age. They were raised in the yard next to the Irish terrier (case No. 4). Just about the time case No. 4 became sick, one of these pups was noticed to be breathing very rapidly. It was evening. The pup was normal at noon the next day; had no elevation of temperature and as it was full of feed no treatment was given. The following day at noon it was still all right but another pup was acting the same way this one had acted when sick. It also recovered in a few hours. But both of these pups subsequently died. This litter was in the process of being sold and about a week later a puppy, which had been sold a day or two previously, was returned for replacement. It was immediately brought to my hospital. It was in great distress, almost gasping for breath, but exhibited only slight evidence of cyanosis (the temperature was not taken). This was at six p.m. I was standing in front of its cage at seven p.m. watching it when it just stopped breathing—keeled over and expired without moving a muscle. A post-mortem examination disclosed a congestion of both lungs but no exudate. The lung tissue appeared to be shrunken but all other organs appeared normal.

Two of the litter, which were sold locally before this trouble broke out, are still well. And another one which went to Buffalo has since died, presumably from the same trouble, because the purchaser telephoned my client asking information and stating the Buffalo veterinarian did not know what to make of it. In all, of the six puppies, four are dead and two are well.

Two other cases of this type have come to my attention but were not returned for further treatment, perhaps owing to a very

guarded prognosis. Both showed the peculiar rapid breathing, lack of appetite, and temperature of 104.5°F.

I have had the usual complement of run-of-the-mill distemper cases, right along. I treat them usually with homologous serum, sulfa drugs, vitamins, etc. I have treated many hundreds of cases of distemper, long before we had homologous serum, sulfonamides and penicillin to help out, but this rapid breathing is something I have not seen before.

H. H. HODGSON, V.S.

Stamford Center, Ont.

Hypertrophy of the Prostate Gland in a Young Dog

In his book, "Diseases of Small Domestic Animals" the late Professor Brumley states, "Hypertrophy [of the prostate] is common in old dogs, and is occasionally observed in young animals." The purpose of this short case history is not so much to record the comparatively rare occurrence of hypertrophy of the prostate in a young dog as to make the assertion that in the routine clinical examination of male dogs a rectal examination should be included as a routine measure.

All practitioners are familiar with the type of client who comes in for free advice, rather than incur the expense of having the sick animal placed under professional care. One day a new client of this sort came into my office with the story that his dog had been subject to fits of moaning and barking, especially when trying to defecate. The animal had been treated by another veterinarian for occluded anal glands but there was no improvement shown.

From the history given I too suspected occluded anal glands and suggested the dog be put on a soft diet and given one tablespoon of Upjohn's emulserol. I suggested this product instead of plain mineral oil, because of the vitamin A it contains.

I also suggested that he keep the dog on this soft diet and laxative for a period of a week and then bring it in for a checkup if no improvement was shown. I had in mind making barium x-ray plates and checking for an intestinal stenosis or diverticulum. I asked if the veterinarian who first treated the case had made a digital rectal examination and was informed that he had not.

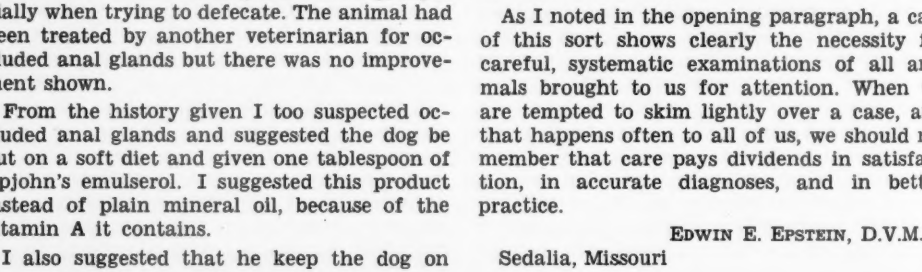
A week later the dog, a three-year-old Cocker Spaniel in excellent condition, was brought to the hospital. It was very nervous and uttered low moans and whines at intervals. The fact that the emulserol was active was evident from seepage around the anal orifice. The anal glands were inspected and found to be free from suppuration or concretions.

Upon inserting the gloved finger in the anus my attention was immediately directed to the greatly enlarged, rather firm prostate gland. Surprisingly, upon pressure and rather vigorous massage, the animal evinced not the slightest pain. After massaging the gland for five minutes, I gave an intramuscular injection of 1mg of stilbestrol and dispensed enteric coated tablets of the same drug, 1mg to be given twice daily. The owner was instructed to return the dog a week later for another injection. At that time rectal examination showed the prostate almost normal in size. A hypodermic injection of stilbestrol was given, but no further oral medication was deemed to be needed. The client was instructed to bring the animal back if the symptoms returned. As yet, three months later, there has been no sign of a relapse, although I believe it can be expected at any time.

As I noted in the opening paragraph, a case of this sort shows clearly the necessity for careful, systematic examinations of all animals brought to us for attention. When we are tempted to skim lightly over a case, and that happens often to all of us, we should remember that care pays dividends in satisfaction, in accurate diagnoses, and in better practice.

EDWIN E. EPSTEIN, D.V.M.

Sedalia, Missouri

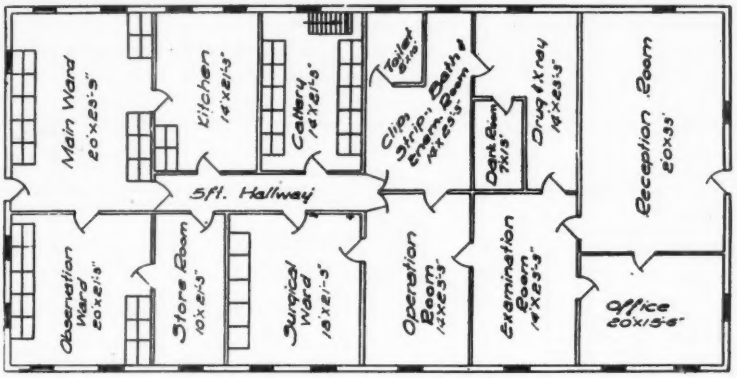


Essentials of a Hospital for Small Animals*

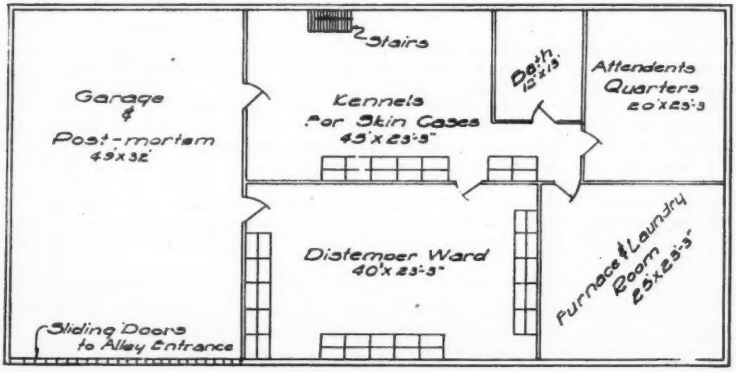
By P. H. Hand
Milbrae, California

A SMALL animal hospital should have at least six wards—observation, surgical, cat, distemper, mange and main ward. Lacking any one of these wards, a small animal hospital lacks adequate facilities to give its cases proper attention. An office, a pharmacy, waiting room, examining room, surgical room, x-ray room, attendant's room, boiler room, enema and clipping room, store room, kitchen and garage are essential to a complete plan.

A small animal hospital should have no waste space; every square foot of its interior should be of use. To attain this, in the plan shown herewith, a short hallway leads from the surgery and enema room back to the main ward. The various other rooms have been allotted the space and location suited to their intended purpose, with the conservation of space always the main factor. A basement below the main floor includes the garage, attendants room, boiler and laundry room, and the mange and distemper wards. With the main floor and basement so arranged, a complete small animal hospital may be housed in a 50x100 foot structure.



MAIN FLOOR PLAN
Bldg. 50'x100' Outside.



BASEMENT PLAN

A small animal hospital must be conveniently arranged to save as many steps as possible during a day's routine. In this plan the reception room is readily accessible from the front entrance and also from the office. The examining and operating rooms are located directly opposite the pharmacy, x-ray, clipping and enema rooms, making these rooms readily accessible to each other. The operating room opens into the surgical ward. The kitchen is centrally located to serve the main ward, observation ward, surgical ward and cat ward, and near the stairway to serve the basement wards. The store room is near the kitchen.

The workableness of this plan may be visualized by tracing with a pencil a small circle tour from the office through the reception room, pharmacy and x-ray room, clipping and enema room, operating room, examining room, back to the office. This group of rooms is so arranged that the busiest zone of the hospital is as conveniently accessible as if it were one large ward. A small hallway lessens the steps between the wards, kitchen, and store room, and opens with the main ward out into the exercise yards. A stairway to the mange ward and other installations in the basement is centrally located. The basement garage, readily

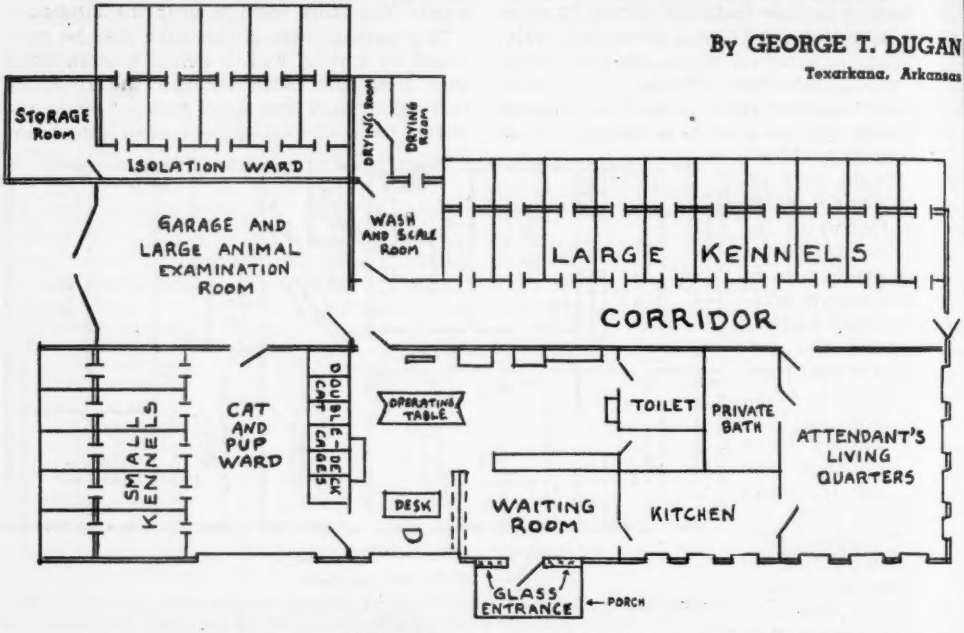
*Reprinted by request from *Vet. Med.*, 41:1, p. 20.

accessible from the alley, provides space for post-mortem examinations and a dipping vat.

In interviewing a number of men who have built small hospitals of their own, not one, seemingly, has been entirely satisfied with his building after it was completed. There always have been features that they would change if they were to rebuild. This plan is believed to eliminate most of the objections I have heard raised and to be workable.

Animal Shelter Converted to Veterinary Hospital*

By GEORGE T. DUGAN
Texarkana, Arkansas



The waiting room is separated from the office desk by a showcase with a partition, in which there is a pay window, above it. The large room arrangement is far from ideal but must serve for the present. It contains the office desk, instrument cabinet, operating table, radiator, refrigerator, sterilizer, a bacteriology laboratory table, a sink and a chemical laboratory table. The large kennels, the kennels in cat and pup ward and in the isolation ward are all double, one-half inside containing a bed, drain and automatic watering device, and one-half outside. In the mild climate of Texarkana, the small outside runs or kennels are a desirable feature. The inside kennels and the outside runs are connected by trap doors operated by chains and pulleys. Small doors also open into the corridor from each kennel. The outside runs or kennels are separated by galvanized iron to a height of five feet and have heavy storm-proof wire netting above. There are no facilities for keeping large animals other than for a few hours in examining (and operating) room. The floors of all rooms and kennels are concrete. The walls are brick, the roof tile and supporting structures steel.

This structure was erected by the Texarkana, Texas-Arkansas Humane Association for an animal shelter. This work of the association was discontinued and the building was leased by Dr. George T. Dugan, who was just out of college, and remodeled to serve as a hospital for both large and small animals. Remodeling the building as shown in the floor plan required a great deal of careful planning and much hard work. The result, however, while not ideal is very satisfactory and of course the investment was much less than the cost of erecting a building for the purpose. It shows no little resourcefulness on the part of a young man without sufficient capital to build a place of his own.

Doctor Dugan's hospital is located in the center of a six-acre plot on a much traveled highway, one-half mile from the city limits and about two miles from the business center of Texarkana, a city of 30,000 population. Although the building is several hundred yards from the nearest residence and has tiled walls and sound absorbent ceilings, barking dogs is a topic of discussion in the neighborhood. This has convinced Doctor Dugan that he would not want to operate an animal hospital in a residential district.

*Reprinted by request from *Vet. Med.* 41:1, p. 21.

Book Reviews

Guide to the Dissection of the Dog. By *Malcolm E. Miller,* D.V.M., Ph.D. Professor and Head of the Department of Veterinary Anatomy, New York State Veterinary College at Cornell University. Illustrated by Pat Barrow. Second edition; 427 pages, 187 illustrations. Published by the author, Ithaca, N. Y., 1948 Price $5.00.

The present work differs from the first edition (*Vet. Med.* December, 1947, p. 484) only in having been expanded to include 40 additional illustrations and 10 additional text pages, on the central nervous system, parts of the digestive and respiratory systems, the external ear canal, and in being substantially bound in cloth instead of paper. The text is again "lithoprinted" from typewritten copy; a poor substitute for printing from type and a worse means of reproducing illustration from photographs.

Like the earlier edition, it is designed for the use of veterinary students in the anatomy laboratory. In the absence of an anatomy of the dog, veterinarians will find it a useful reference work on this subject.

* * * *

Index of Treatment in Small Animal Practice. By *Hamilton Kirk,* M.R.C.V.S., Member British Institute of Radiology, Official Veterinary Surgeon to Clayton Greyhound Stadium, author of "Canine Distemper," "Diseases of the Cat," and "Index of Diagnosis, Clinical and Radiological for the Canine and Feline Surgeon."

This is a companion work to the author's "Index of Diagnosis" published three years ago. It will undoubtedly meet the same enthusiastic reception accorded the earlier work for, like it, this work is packed with a tremendous amount of practical information derived from the author's extensive small animal practice in London.

The "Index" part of the work comprises Part II, in which all of the common and certainly most of the uncommon ailments of the dog and cat are taken up alphabetically and discussed, concisely, yet in sufficient detail for a reference work for the practitioner. Sometimes, however, the author misses his terminal facilities and wanders hopelessly for pages. "Lice" is an example. This parasite, one of lesser importance, is accorded seven pages or say 20 times the average for parasites and diseases. Fortunately, lapses of this sort are rare. One other minor criticism is the mention of too many remedies for the various conditions. This is not a historical work. Listing the best two or three remedies should suffice.

The author constantly refers to proprietary remedies by their trade names, without giving any indication of their composition. This will prove annoying to American readers to whom most of these trade names are unfamiliar. Indiscriminate capitalization—"The irrigating fluid may be warm salt solution, Milton, Flavazole solution, iodine 0.5 per cent, or chinosol 1-200," etc.—and lack of uniformity in abbreviation—"The following are useful: potassium nitrate, acetate, citrate, or bitartrate; liq. ammon. acet., to increase the output of urine; and mag. sulph., sodae, sulph., cascara, etc., as bowel eliminatives"—would be unacceptable to an American publisher. However, "Index of Diagnosis" is subject to similar criticism, but apparently it affected its popularity not one whit.

Part I deals with the methods available to the small animal practitioner—wave lengths of light, heat, and electric currents, 20 pages; chemotherapeutic agents, 20 pages; hormone therapy, 50 pages; vaccines and sera, 10 pages; vitamins, 10 pages; and sedatives, anesthetics, and antiseptics, 30 pages.

Part III deals with miscellaneous subjects, including special technics—handling, feeding, nursing, euthanasia, destruction of rodents, giving medicines, etc.

Perhaps to say "Index of Treatment" is all meat and no embellishment describes it.

* * * *

Pregnancy Diagnosis Tests. A Review. By *Alfred T. Cowie,* B.Sc., M.R.C.V.S., Ph.D National Institute for Research in Dairying, University of Reading. 283 pages. Published by the Commonwealth Bureaux of Animal Breeding and Genetics, Dairy Science, and Animal Health, 1948. Price $4.00.

Although clinical tests for pregnancy were described in Egyptian medicine 4000 years ago and have been employed through the ages to the present time, it is only within the last half century and principally within the last 25 years that the hormonal and biochemical tests and tests based upon physiological and immunological phenomena have been developed for the early diagnosis of pregnancy in farm animals. A large body of literature on the subject has accumulated in the past 20 years.

The author observes: "In this field of investigation, no comprehensive review of the literature has appeared, and the investigator must needs spend much time in searching the literature before an adequate picture of the work on this problem can be obtained."

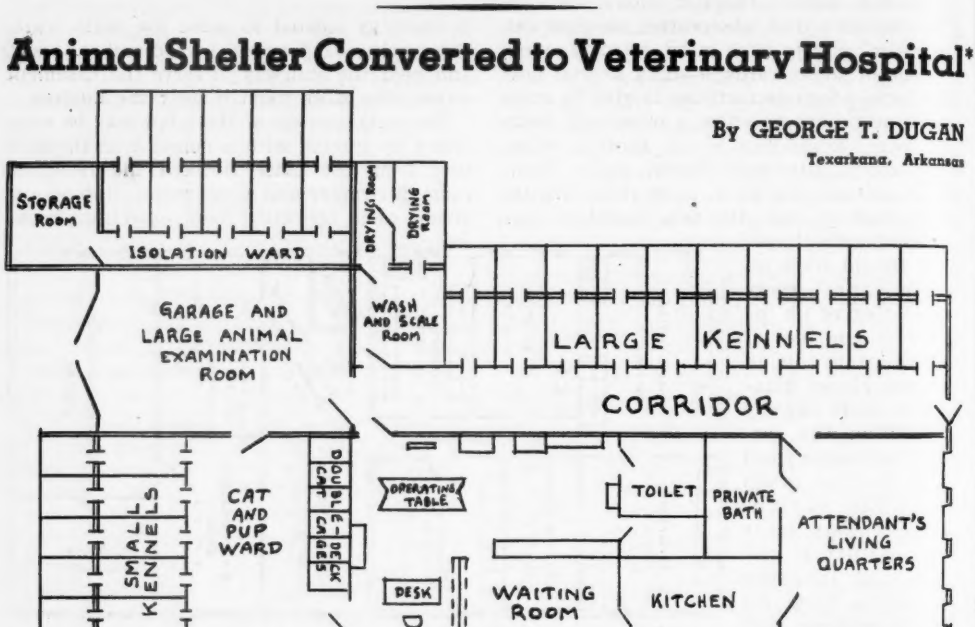
This work fulfills the need for such a review handsomely. It supplies a brief summary of the more important researches, leading to the development of pregnancy tests in domestic animals, and an unusually complete bibliography of 100 pages and some 2000 titles.

accessible from the alley, provides space for post-mortem examinations and a dipping vat.

In interviewing a number of men who have built small hospitals of their own, not one, seemingly, has been entirely satisfied with his building after it was completed. There always have been features that they would change if they were to rebuild. This plan is believed to eliminate most of the objections I have heard raised and to be workable.

Animal Shelter Converted to Veterinary Hospital*

By GEORGE T. DUGAN
Texarkana, Arkansas



The waiting room is separated from the office desk by a showcase with a partition, in which there is a pay window, above it. The large room arrangement is far from ideal but must serve for the present. It contains the office desk, instrument cabinet, operating table, radiator, refrigerator, sterilizer, a bacteriology laboratory table, a sink and a chemical laboratory table. The large kennels, the kennels in cat and pup ward and in the isolation ward are all double, one-half inside containing a bed, drain and automatic watering device, and one-half outside. In the mild climate of Texarkana, the small outside runs or kennels are a desirable feature. The inside kennels and the outside runs are connected by trap doors operated by chains and pulleys. Small doors also open into the corridor from each kennel. The outside runs or kennels are separated by galvanized iron to a height of five feet and have heavy storm-proof wire netting above. There are no facilities for keeping large animals other than for a few hours in examining (and operating) room. The floors of all rooms and kennels are concrete. The walls are brick, the roof tile and supporting structures steel.

This structure was erected by the Texarkana, Texas-Arkansas Humane Association for an animal shelter. This work of the association was discontinued and the building was leased by Dr. George T. Dugan, who was just out of college, and remodeled to serve as a hospital for both large and small animals. Remodeling the building as shown in the floor plan required a great deal of careful planning and much hard work. The result, however, while not ideal is very satisfactory and of course the investment was much less than the cost of erecting a building for the purpose. It shows no little resourcefulness on the part of a young man without sufficient capital to build a place of his own.

Doctor Dugan's hospital is located in the center of a six-acre plot on a much traveled highway, one-half mile from the city limits and about two miles from the business center of Texarkana, a city of 30,000 population. Although the building is several hundred yards from the nearest residence and has tiled walls and sound absorbent ceilings, barking dogs is a topic of discussion in the neighborhood. This has convinced Doctor Dugan that he would not want to operate an animal hospital in a residential district.

*Reprinted by request from *Vet. Med.* 41:1, p. 21.

Book Reviews

Guide to the Dissection of the Dog. By *Malcolm E. Miller*, D.V.M., Ph.D. Professor and Head of the Department of Veterinary Anatomy, New York State Veterinary College at Cornell University. Illustrated by Pat Barrow. Second edition; 427 pages, 187 illustrations. Published by the author, Ithaca, N. Y., 1948 Price $5.00.

The present work differs from the first edition (*Vet. Med.* December, 1947, p. 484) only in having been expanded to include 40 additional illustrations and 10 additional text pages, on the central nervous system, parts of the digestive and respiratory systems, the external ear canal, and in being substantially bound in cloth instead of paper. The text is again "lithoprinted" from typewritten copy; a poor substitute for printing from type and a worse means of reproducing illustration from photographs.

Like the earlier edition, it is designed for the use of veterinary students in the anatomy laboratory. In the absence of an anatomy of the dog, veterinarians will find it a useful reference work on this subject.

* * * *

Index of Treatment in Small Animal Practice. By *Hamilton Kirk*, M.R.C.V.S., Member British Institute of Radiology, Official Veterinary Surgeon to Clayton Greyhound Stadium, author of "Canine Distemper," "Diseases of the Cat," and "Index of Diagnosis, Clinical and Radiological for the Canine and Feline Surgeon."

This is a companion work to the author's "Index of Diagnosis" published three years ago. It will undoubtedly meet the same enthusiastic reception accorded the earlier work for, like it, this work is packed with a tremendous amount of practical information derived from the author's extensive small animal practice in London.

The "Index" part of the work comprises Part II, in which all of the common and certainly most of the uncommon ailments of the dog and cat are taken up alphabetically and discussed, concisely, yet in sufficient detail for a reference work for the practitioner. Sometimes, however, the author misses his terminal facilities and wanders hopelessly for pages. "Lice" is an example. This parasite, one of lesser importance, is accorded seven pages or say 20 times the average for parasites and diseases. Fortunately, lapses of this sort are rare. One other minor criticism is the mention of too many remedies for the various conditions. This is not a historical work. Listing the best two or three remedies should suffice.

The author constantly refers to proprietary remedies by their trade names, without giving any indication of their composition. This will prove annoying to American readers to whom most of these trade names are unfamiliar. Indiscriminate capitalization—"The irrigating fluid may be warm salt solution, Milton, Flavazole solution, iodine 0.5 per cent, or chinosol 1-200," etc.—and lack of uniformity in abbreviation—"The following are useful: potassium nitrate, acetate, citrate, or bitartrate; liq. ammon. acet., to increase the output of urine; and mag. sulph., sodae, sulph., cascara, etc., as bowel eliminatives"—would be unacceptable to an American publisher. However, "Index of Diagnosis" is subject to similar criticism, but apparently it affected its popularity not one whit.

Part I deals with the methods available to the small animal practitioner—wave lengths of light, heat, and electric currents, 20 pages; chemotherapeutic agents, 20 pages; hormone therapy, 50 pages; vaccines and sera, 10 pages; vitamins, 10 pages; and sedatives, anesthetics, and antiseptics, 30 pages.

Part III deals with miscellaneous subjects, including special technics—handling, feeding, nursing, euthanasia, destruction of rodents, giving medicines, etc.

Perhaps to say "Index of Treatment" is all meat and no embellishment describes it.

* * * *

Pregnancy Diagnosis Tests. A Review. By *Alfred T. Cowie*, B.Sc., M.R.C.V.S., Ph.D National Institute for Research in Dairying, University of Reading. 283 pages. Published by the Commonwealth Bureaux of Animal Breeding and Genetics, Dairy Science, and Animal Health, 1948. Price $4.00.

Although clinical tests for pregnancy were described in Egyptian medicine 4000 years ago and have been employed through the ages to the present time, it is only within the last half century and principally within the last 25 years that the hormonal and biochemical tests and tests based upon physiological and immunological phenomena have been developed for the early diagnosis of pregnancy in farm animals. A large body of literature on the subject has accumulated in the past 20 years.

The author observes: "In this field of investigation, no comprehensive review of the literature has appeared, and the investigator must needs spend much time in searching the literature before an adequate picture of the work on this problem can be obtained."

This work fulfills the need for such a review handsomely. It supplies a brief summary of the more important researches, leading to the development of pregnancy tests in domestic animals, and an unusually complete bibliography of 100 pages and some 2000 titles.

The author has surveyed all important papers on the diagnosis of pregnancy in women and domestic animals with the exception of those concerned with clinical methods in women. The opening chapter deals with clinical methods applied to domestic animals. The other tests are classified according to their basis on hormonal, enzymic, other biochemical, immunological, and physiological phenomena. Their accuracy under different conditions and for different species is assessed. This work will thus be of direct interest to research workers in the fields of animal and human reproduction as well as to practicing veterinarians, gynecologists and obstetricians.

* * * *

Surgical Technic for Veterinary Students. By *W. G. Guard,* D.V.M., Chairman, Department of Veterinary Surgery, The Ohio State University. Spiral bound 179 pages; illustrated; "lithoprinted." Published by the author, O.S.U., Columbus, Ohio, 1948. Price $5.00.

A great deal of wisdom is embodied in this work, which epitomizes the study and experience of nearly 40 years in the lecture room and college clinics. Although designed as a guide to surgical exercises for students, the directions are equally applicable for surgical operations in the field of practice.

In the main, the treatise on a given operation includes: Indications, preoperative considerations, preparation of the field, anesthesia, operative technic, and after care. As a rule rather less than two pages are devoted to major operations. All ordinary operations are described. The directions are concise, definite and unambiguous.

The work is divided: Introduction 29 pages, equine surgical operations 54 pages, castration of farm animals seven pages, canine and feline surgical operations 14 pages, fractures of the horse and ox 27 pages, and two or three pages each on dislocation of the fetlock, flattened tracheal rings, atresia of the tear duct, and umbilical hernia.

Notwithstanding the long period that the author's labors have been exclusively in a highly specialized field, he writes without the blinkers of specialization. "Indications" are based solely upon advantage of the operation to the animal and its owner. "Operative technic" is governed throughout by what is necessary for prompt and complete healing of the wound. Surgery for the sake of surgery receives no consideration in this work. It could not be that—"the operation was a success but the patient died." Except it attain its objective the operation, however brilliant, is a failure, in the Guard philosophy.

Abstract

The Cultivation of the Foot and Mouth Disease Virus on Bovine Fetal Tissue

During 1947 the research work on the cultivation "in vitro" of foot-and-mouth disease virus was greatly intensified.[1]

The virus was cultivated up to the 6th passage with excellent results. This passaging has been discontinued because it was not directly concerned with the research in hand, for the primary aim has been to obtain a sufficient quantity of virus to prepare vaccine.

However, we shall not overlook research work on a larger number of susceptible continuous passages, virus titrations, and antigenic properties involved.

Our present position regarding the research on cultivation of foot-and-mouth disease virus can be roughly defined as follows:

a. A three-month-old bovine fetus skin is essential for the cultivation of foot-and-mouth disease virus.

b. Spleen, lung, kidney, esophagus, testicle, lip, and tongue were also used to compare the growth of virus in the tissues mentioned.

c. Stimulant substances are used to intensify the tissue culture. These are extracted from the bovine fetus brain and muscle.

d. Heparinized bovine plasm is used.

e. The saline solution used is Ringer's at pH 7,6; the maximum tissue growth is detected at between 76 and 100 hours.

f. Cultures are placed in a heater for 96 hours at a temperature of 37°C.

g. The titration in the cultivated virus showed activity up to a dilution of: 1:10,000. Further titrations will be effected.

h. Storing the virus at 3°C. to 4°C. for 4864 hours has not affected the activity of the cultures.

i. The behavior of Argentine O, A and C type strains in the cultures is: O and C were constant while A type gave inconstant results.

j. In all cases, the cultures, when injected, provoked the disease in cattle.

k. The lesions reproduced in cattle infected with the cultivated virus do not differ from the lesions which normally occur from natural infection.

l. With the cultivated virus a trivalent concentrated vaccine (Waldman-Kobe type) has been elaborated with encouraging results in the laboratory and in field tests.

[1]By Dr. E. E. Palma Zuloaga, assistant director of the National Institute for Foot-and-Mouth Disease Research, Ministry of Agriculture, Argentina.—Author's summary.